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THE
AMERICAN HOSPITAL
OF THE
TWENTIETH CENTURY

By
EDWARD F. STEVENS, Architect

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Columbia University
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THE AMERICAN HOSPITAL OF THE TWENTIETH CENTURY

A treatise on the development of medical
institutions, both in Europe and in America,
since the beginning of the present century.

By
EDWARD F. STEVENS, Architect
Member of American Institute of Architects
Member of Province of Quebec Association of Architects
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To Warren LeVerne Babcock, M. D., Superintendent of Grace Hospital, Detroit, Michigan, whose advice and encouragement decided the writer of this book to devote his entire practice to medical institutions, this book is respectfully dedicated.

THE AMERICAN HOSPITAL OF THE TWENTIETH CENTURY

FOREWORD

In visiting the hospitals of Europe, one finds on every hand splendid examples of hospital architecture. The administrators of these institutions take pride not only in laying before the foreign visitor for inspection the institution itself, but in providing him with carefully prepared plans and descriptions of the institution and its equipment. Everywhere one can obtain profusely illustrated books on the modern hospitals of the locality, books written and published by hospital administrators, architects, and engineers. These books are most helpful to the native as well as to the foreigner.

While visiting these foreign institutions, the writer has been asked repeatedly for the names of recent books on American hospitals. Such books are, alas, very few in number, and there are none commensurate with the rapid growth and development of the modern American hospital.

It is in response to this demand that the writer has endeavored to collect plans and information concerning a few of the many good institutions recently finished or under construction, with the hope that interest in the publication of such works will grow and that this book will be only a forerunner of much more comprehensive treatises. It is not the writer's intention to criticise the plans of the institutions here shown, but to present them as various solutions of the great problems of housing and caring for the sick and to point out a few of the findings of his own experience in the planning of more than fourscore hospitals and institutions. The field is so broad that it is impossible more than to touch upon the various points.

If frequent mention is made of hospitals in Europe, it is for the purpose of comparison, with the hope that the study and comparison may interest the reader, as it did the writer in collecting the data.

The chapters on the Ward Unit, the Surgical Unit, the Medical Unit, and the Equipment are taken largely from papers by the writer which were read before the American Medical Association and the American Hospital Association.

The chapters on Heating, Ventilation, Plumbing, and Landscape Work have been reviewed and suggestions given by prominent specialists in each line, for which advice the writer is much indebted.

EDWARD F. STEVENS.

Boston, February, 1918.

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THE AMERICAN HOSPITAL OF THE TWENTIETH CENTURY

CHAPTER I.

In General

Historical. It would be vastly interesting to trace the evolution of hospital building and equipment from the crude structures of ancient times designed to house the sick, to the comprehensive hospital of today, and to show how architecture and equipment have advanced stride for stride with medical and surgical progress; but in these days of vivid and insistent research and accomplishment there is no time for comparative speculation or historical review. All our energies are needed to keep pace with the newly devised methods which are constantly being put in practice and to facilitate these achievements by proper housing and equipment. Hospital building, since the beginning of the twentieth century, has increased enormously.

In 1911 Dr. Charles P. Emerson* stated the number of hospitals in the United States to be 2,547; and the data available in 1914 gave the total number as 7,000, housing 1,000,000 persons, of whom 580,000 were patients. Even with this vast number, only about† “twelve per cent. of the sick people in this country who are ill enough to need a doctor are cared for in hospitals.”

The line of advance has been influenced not only by the medical men and the nursing force, but by the social welfare worker, the hospital commission, the so-

ciety to suppress tuberculosis, and the public at large; for the people are realizing that the hospital is built to benefit humanity and not to afford a place in which to die. “All hope abandon ye who enter here” no longer is the appropriate inscription for the hospital gate. But this advance has been by gradual steps,—an improved ward unit here; better methods of service there; building up thus by experimental work and research a standard to meet the needs as they appear, and with the ever-increasing feeling that the welfare of the patient is of more importance than the zeal for science.

Hospital Sites. Before taking up the subject of the planning of the hospital itself, we must consider the very important subject of the site. Attractive locations for public buildings or even for residences are rarely suitable for hospitals.

The improvement of the patient, which is the fundamental purpose of the institution, depends in large measure on its situation and environment—the contour of the land, the surrounding country, the aspect, the accessibility for friends of the patient and for visiting physicians, remoteness from disturbing influences, a site of sufficient size to insure privacy, are all contributory elements for the process of recovery.

A southern exposure is always desirable, with the land sloping toward the

*Hospital Management, W. B. Saunders Co.

†Editorial Modern Hospital, Vol. VIII, No. 1.

south. If in the country, it is still more advantageous if the north is protected by evergreen trees.

Enough land should be provided to allow for growth. In building even the first portion, the future should be considered and the plans for the development of the entire institution studied and worked out so that the structures may be grouped to the best advantage. Whatever portion is built, it should be done with reference to the completed whole. Oftentimes the central or administration building is all that can be managed in the beginning, and in this must be disposed temporarily all the departments.

If the site is in the city, the same care in selection should be exercised. Smoke from adjoining chimneys, noise from nearby railroads, and proximity to a noisy thoroughfare or factory are menaces to be considered.

The suggestions for treating the grounds of an institution will be taken up in the chapter on Landscape Architecture.

Buildings. The building or buildings should be simple in style and designed to make a pleasing impression upon the patients with the entrance speaking a welcome. The motto suggested for the Virchow, in Berlin, might well be placed over the entrance of many another hospital—"While treating the disease, do not forget to treat the man."

Hospital planning demands the same careful thought that is the foundation of any modern successful business enterprise. It is essential in the shoe factory, the paper mill, or the business establishment to so plan that the raw materials may be assembled and the finished product delivered with the fewest possible intervening motions. In the hospital the patient, the food and the treatment may be termed the raw material. Whatever conduces to recovery, the convalescent being the finished product, is of business importance in the hospital. The care, the comfort, the convenience and the food, together with the treatment, are the processes of manufacture. The hospital planner must seek to eliminate here all lost motion or unnecessary work.

In the factory the saving of time in any

of the processes adds to the annual product, and in the hospital, likewise, careful scientific nursing, freedom from disturbing elements and everything that can help early convalescence, add to the efficiency of the institution. With the demands for accommodations that are made in these days, any factors that will increase the percentage of hospital capacity will be truly valuable. Location is here most important, an environment that will be an uplift to the patient; an outlook that while distant from industries may still remind the patient that he is a part of the world's life and activity, sunlight and ventilation and the modern fresh air balcony; these items and many others are factors toward increased hospital capacity. Internal disturbances should be avoided by planning the noisy rooms at a distance from the wards and there are many important relations of the utilities to be considered, a single example of which may be the illumination in such a

Influence of European Hospitals. The good influence of European hospitals is shown in many of our modern American institutions. While we would not consider duplicating any one European institution, we do receive from them valuable suggestions for the solution of many a perplexing hospital problem. The general relation of one department to another, the method of preparing and serving food, the housing and treatment of patients, the orientation and environment, and the proportion of sunlight and shadow are some of the things upon which we may receive enlightenment. The hospital which would be perfect and which would fulfill the climatic conditions of southern France, however, would be entirely unsuitable in our northern states.

If we can put the European hospital on our dissecting table and remove the part we cannot use, we will still have a pretty good portion of the body left. By this metaphor I do not assume that hospital architecture is a dead subject—far from it. It is very much alive. Only last week our medical co-worker asked to have provision made for a patient in a warm, closed room, with hot baths; yesterday, the same patient was to be kept

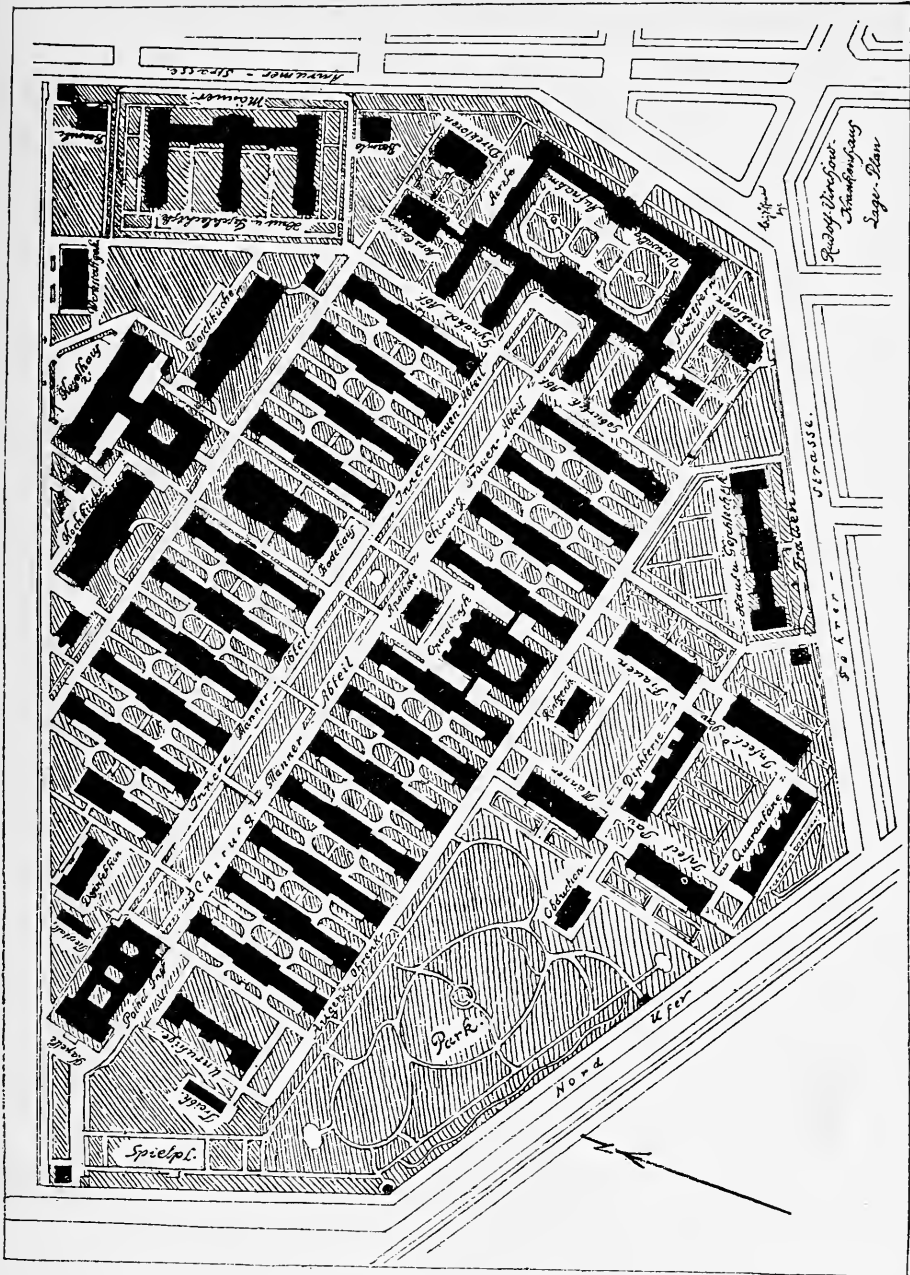


FIG. 1. GENERAL PLAN, RUDOLPH VIRCHOW HOSPITAL.

in the open air; today, ice baths are prescribed; and we must study the clinics very closely to find out what will be wanted tomorrow, for the hospital architect must meet the latest demand.

In one foreign institution we may find

the ideal ward unit; in another, a service building of peculiar fitness; and in still another, the perfect floor (although the ideal hospital floor does not seem to have been discovered yet). One institution will have an ideal operating or medical

department, while in others the architects will have solved new problems in detail and equipment.

The twentieth century hospital, whether built in Spain, Russia, or the United States, has one common condition in its program—that is, *to give the patient the best chance for recovery*. If a more thorough study of sanitation, ventilation, nursing, disturbing elements, orientation, and environment, one or all, will help us to design buildings that hasten convalescence and produce the desired results, then that information must

out grounds and parks, with their walks and drives, become the ideal place for convalescents. One of the rules of these parks is that on every third day they are for the sole use of the patients, every third day for the sole use of the staff, and every third day for the sole use of the nurses.

The surgical group, on the left of the main axis, is connected with the operating building, while the medical group has the bath-house occupying the same strategic position. The isolation group occupies a portion of the extensive

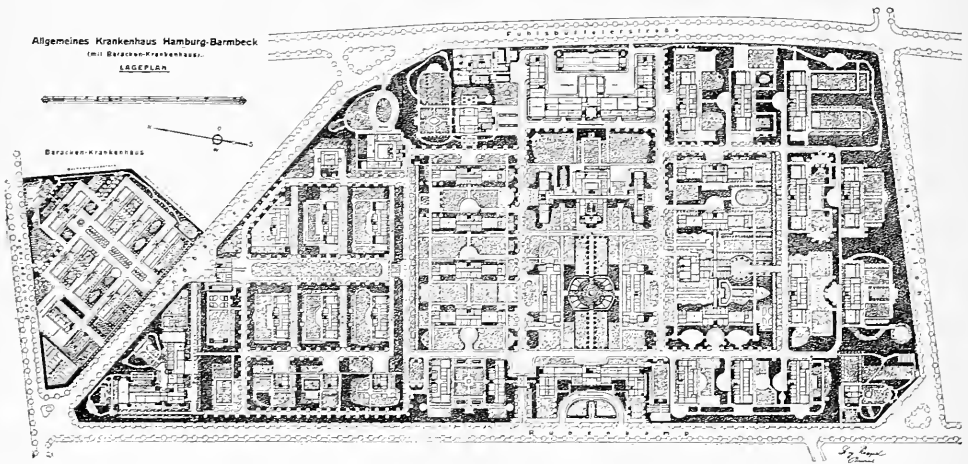


FIG. 2. BARMBECK HOSPITAL, HAMBURG. GENERAL PLAN.

be obtained; and, if necessary, we should be willing to circle the globe for it.

Some European Hospitals. A few examples of European hospitals will show some of the features which have interested the writer in his study of the subject.

Perhaps the most familiar of the modern hospitals is the Virchow (Fig. 1) at Berlin. This was built by Architect Ludwig Hoffmann in 1907, and is of the pure pavilion plan. It has a capacity of two thousand beds. With the exception of two ward units connected with the surgical or operating buildings and the administrative group, the buildings are all isolated and are of one story so far as the patients are concerned. Owing to the ease with which the patients can be taken from the buildings, the beautifully laid-

grounds on the south, and the service buildings on the north.

The ward pavilions, of which there are twenty practically alike, consist of two twenty-bed wards, with service at the center and at the ends, and with room for attendants in the second story of the central portion.

The floors of the wards are elevated but a few feet above the ground, giving a ready entrance for the patients and for the food, both of which are carried over-ground.

The new *Barmbeck III*, City Hospital at Hamburg (Fig. 2), built by Baurat F. Ruppel, consists of forty-four buildings, and will house fifteen hundred patients. In this plan Ruppel has varied somewhat from his usual method, in placing the center of the medical unit—the

bath-house—on the axis of his plan. In the St. Georg, the Eppendorf, the Virchow, and other large German hospitals the bath-house is placed on the medical side, balancing the operating building as the center of the surgical side.

forty-six buildings, two or three stories high. These buildings, while isolated above ground, are all connected by wide, well-lighted, underground corridors. The bath-house, while far removed from the medical buildings, serves for out patient

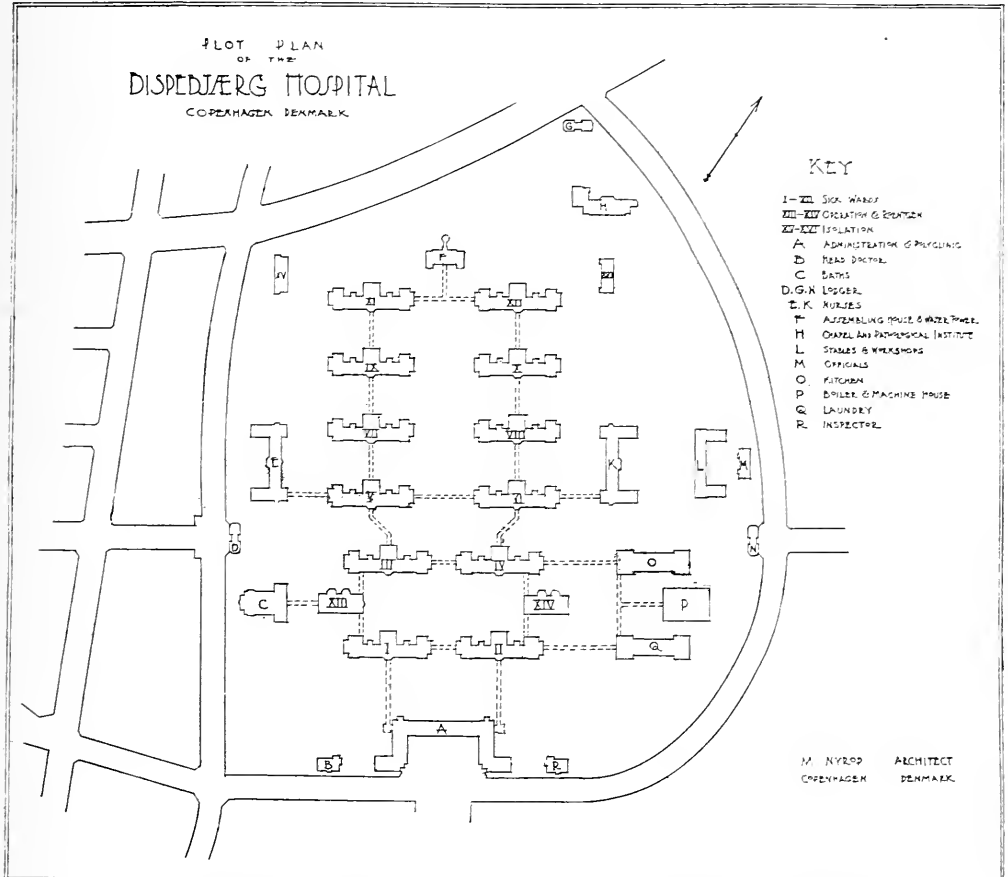


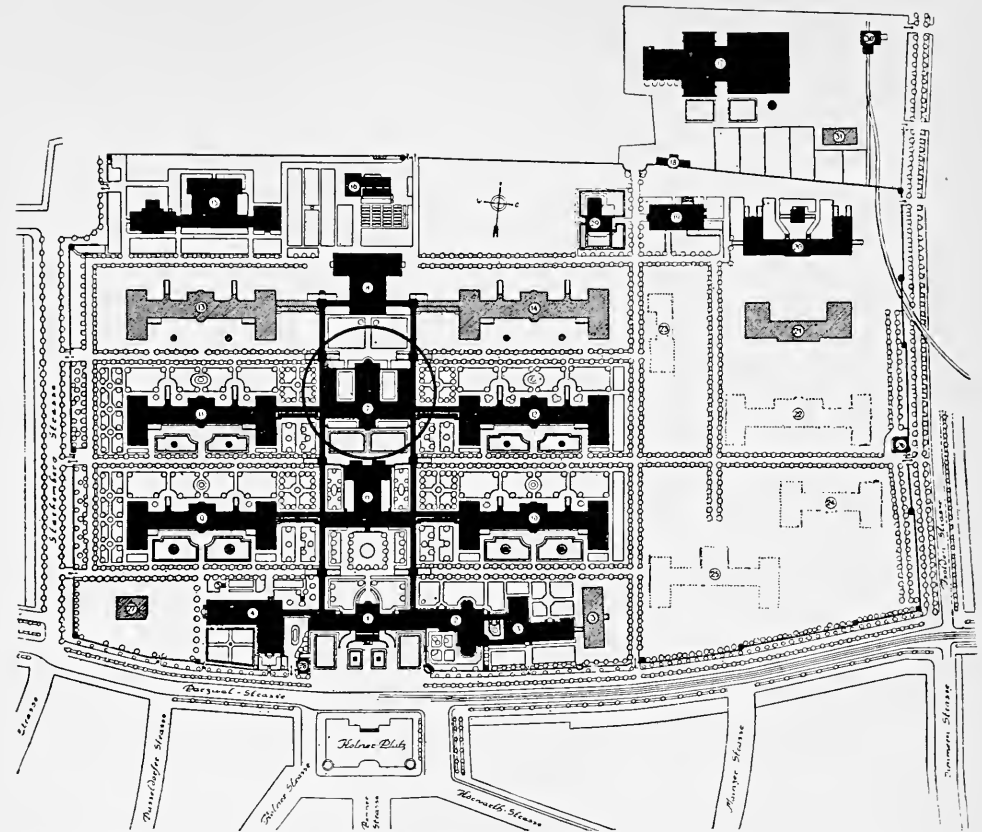
FIG. 3. GENERAL PLAN, BISPEBJERG HOSPITAL, COPENHAGEN, DENMARK.
M. Nyrop, Architect.

In the Barmbeck, coupled with the medical center, is the patients' entertainment hall, which is used also for a church. On the surgical side, three of the pavilions are connected by corridors, while the fourth is isolated. All other buildings throughout the group are isolated.

The *Bispebjerg Hospital* of Copenhagen (Fig. 3), designed by Professor Martin Nyrop, is located on slightly rising ground. The site is ideal, containing fifty-one acres. The hospital consists of

clinics as well as for hospital patients. The grounds are laid out with special care for the comfort of the patients, with arbors, benches, and fountains.

One of the most modern and complete hospitals in Germany is *Munich-Schwabing* (Fig. 4). In this building Architect Richard Schachner has embodied the best of German planning and coupled with it the most valuable of American ideas. While he has separate pavilions, he also has everywhere connecting corridors above ground, except to the con-



1. Main building.
2. Chapel.
3. Sisters' building.
4. Administration building and apothecary.
5. Benzine building.
6. Operation building.
7. Main bath.
8. Kitchen.
9. Male out-patients' building.
10. Female out-patients' building.
- 11, 13. Male patients' buildings.
- 12, 14. Female patients' buildings.
15. Disinfecting building and laundry.
16. Garden and workshop.
17. Machinery building.
18. Animal experiment building.
19. Pathological building.
20. Segregation building.
21. Contagion building.
22. Skin and sex disease building.
23. Mental disease building.
24. Children's building.
25. Gynecological building.
26. Janitors' quarters.
27. Director's residence.
28. Public lavatory.
29. Main administration building and residence.
30. Coal house.
31. Building for help of electric plant.

FIG. 4. GENERAL PLAN, MUNICH-SCHWABING HOSPITAL, MUNICH, GERMANY.

Richard Schauchner, Architect.

tagious and special treatment buildings, and between these there are underground passageways.

The administration is in the center, flanked by the chapel and the nurses' residence on one side and by the office and the home for the staff on the other. The surgical group has for its center the operating building; and the medical unit, a splendid bath-house. This bath-house is considered the finest in Europe connected with a general hospital, and will be described in another chapter.

American Hospitals. The *Peter Bent Brigham Hospital* (Fig. 5), created by the bequest of six million dollars from the man for whom it is named, was

opened in 1913. In the year 1907 a competition was held by the Trustees, seven architects being invited to submit plans, which resulted in the selection of Codman & Despradelle. Perhaps no hospital in America has had more study and thought put into it than has this institution, and the plan is worthy of much study. Under the guidance of the superintendent, Dr. H. B. Howard, the architects and engineers have developed a comprehensive plan which gives the patient every advantage of open air, sunlight, and quick and quiet service.

In planning for the *Cincinnati General Hospital* (Fig. 6), the City was wise in the selection of a site which would give

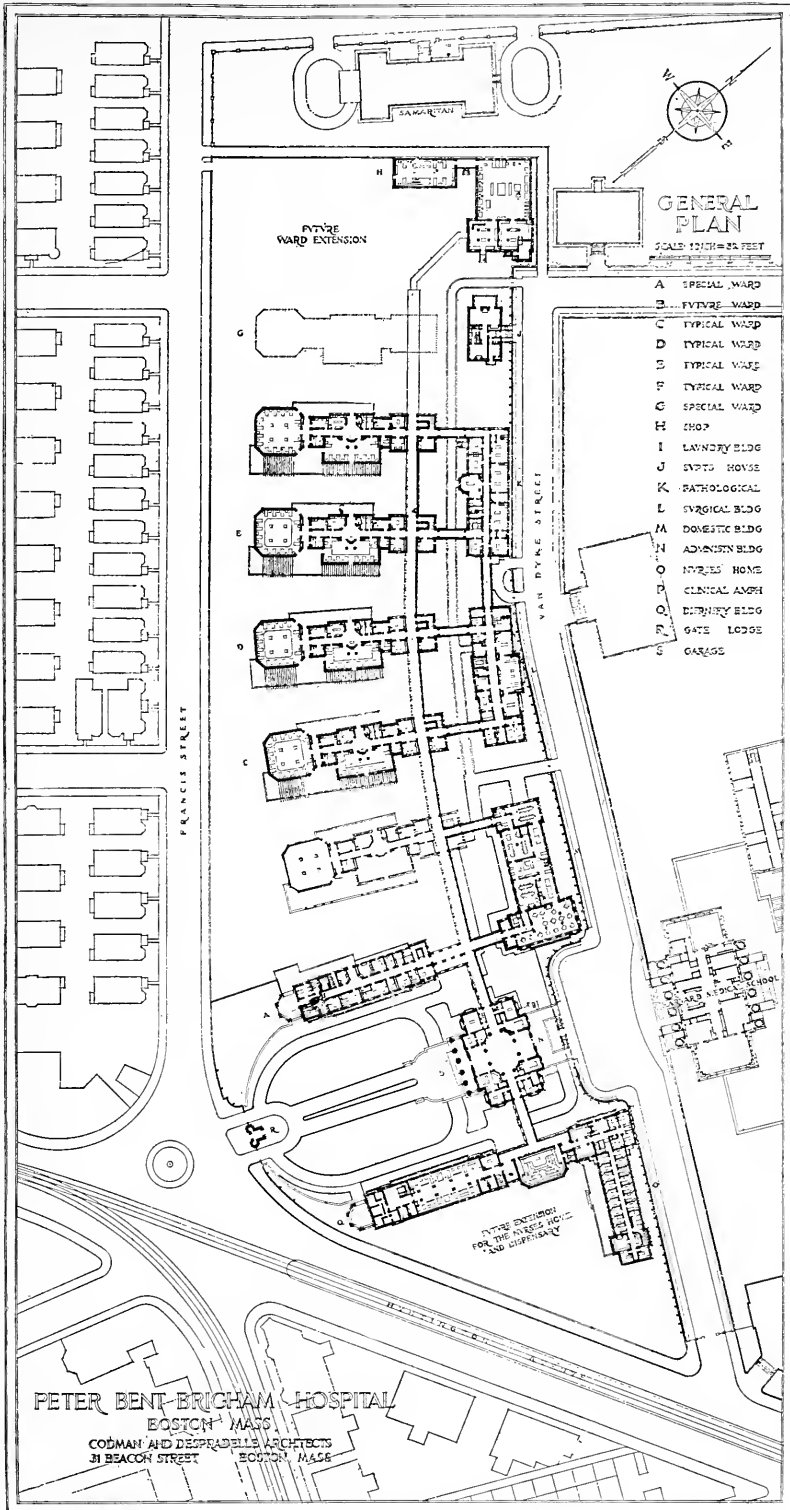
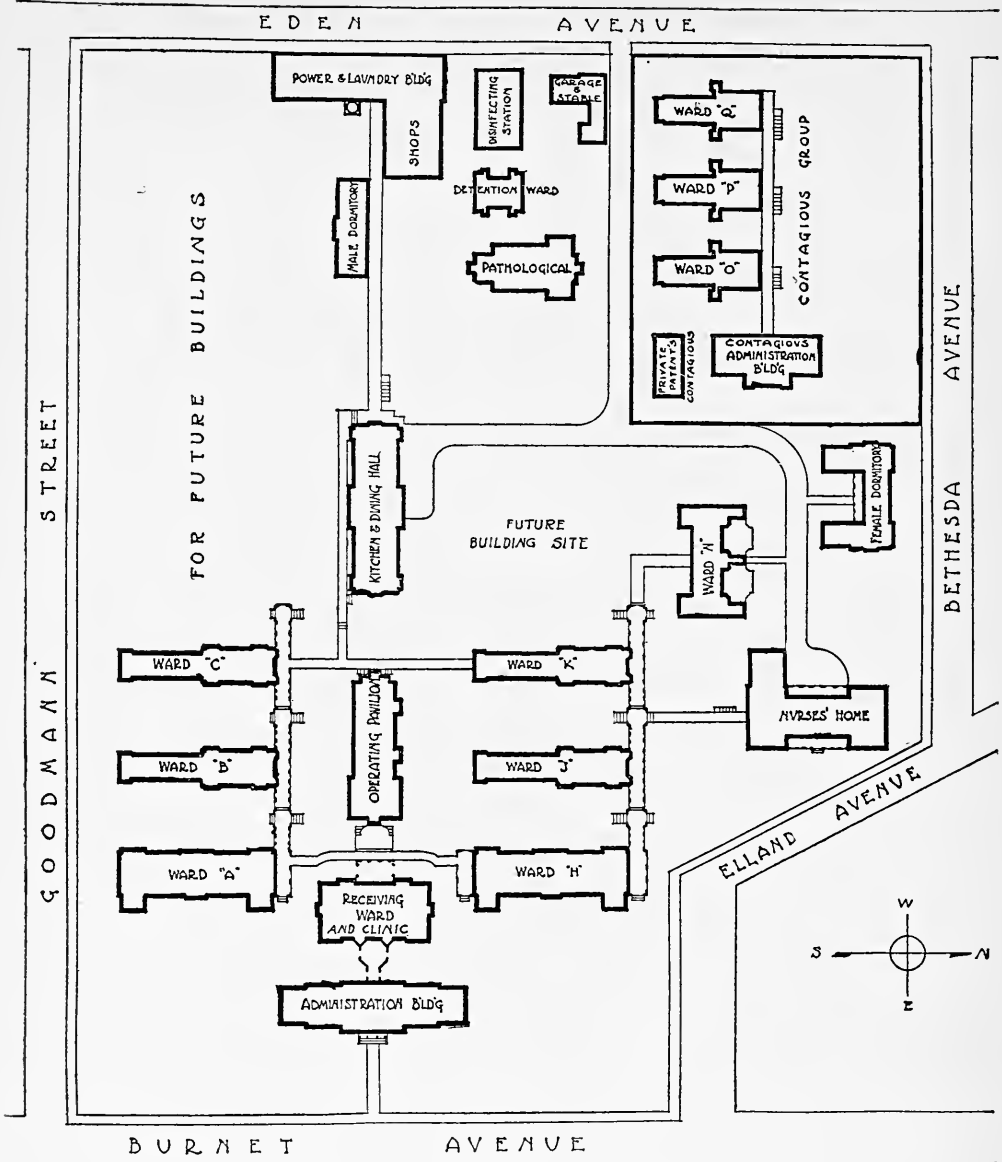


FIG. 5. PETER BENT BRIGHAM HOSPITAL.



CINCINNATI GENERAL HOSPITAL. GENERAL PLAN.

sufficient room for growth. It was also wise in its appointment of Dr. Christian R. Holmes as medical adviser, since the time and thought he has given to this institution, after studying foreign and American hospitals, has made it one of the leading hospitals of the world. Dr. Holmes was ably assisted by the architects, Samuel Hannaford & Son.

The trustees of the *Henry Ford Hospital*, Detroit, were farseeing in the selection of their site. The results of careful study of the European hospitals are noticeable in their plans, made by Architect William B. Stratton.

The plans of the *Toronto General Hospital*, Toronto, Canada, were developed through a term of years, and show much

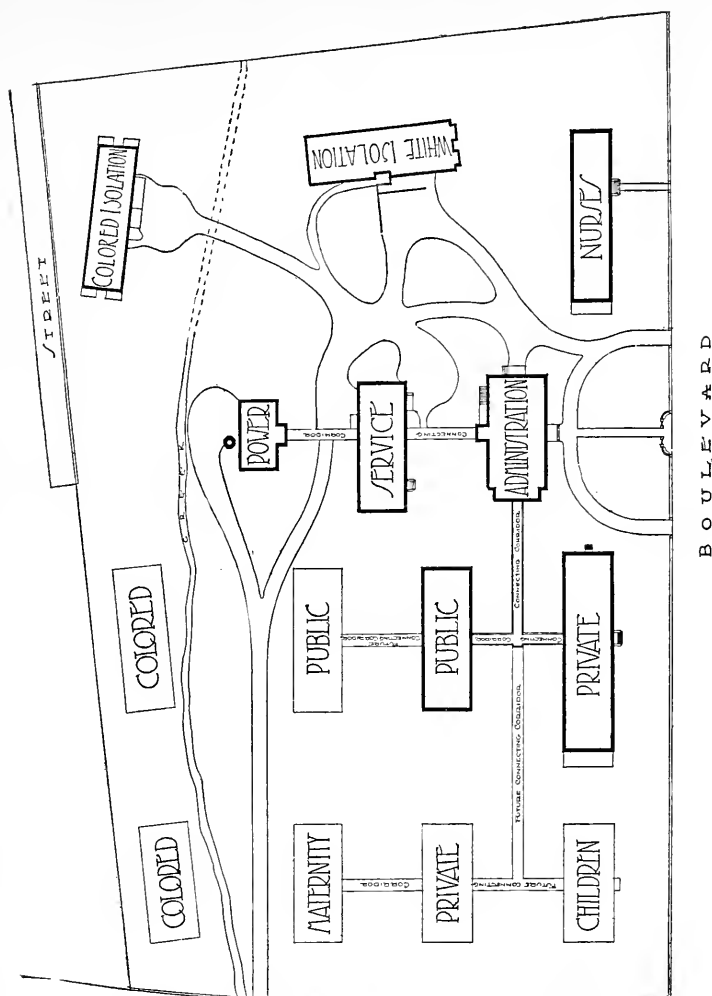


FIG. 7. ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA. PLAN OF THE GROUP.

careful study. This hospital exhibits the influence of the English institutions, particularly in the surgical units, where each unit is placed under the charge of one surgeon, who has his own operating rooms. This makes of every unit a complete hospital.

The detached buildings of many of the European hospitals seem ideal for the climate for which they are built; but in America, especially in the rugged climate of the northern part, protection must be given the patient in going from building to building, and connecting corridors, at least, are generally provided. In the mild climate of Florida, however, at St.

Luke's Hospital (Fig. 7), Jacksonville, it has been possible to build detached pavilions with open corridor connection.

The group will consist of fourteen buildings, eight of which are finished and occupied. The administration building is in the center, with the ward and treatment buildings to the south. There are six or eight of these ward and treatment buildings, only two being now built. The domestic building, containing kitchen and dining-rooms, is directly behind the administration, while the power house and laundry are still farther back. The nurses' residence occupies a position corresponding to that of the private ward.

Two buildings for the care of infectious diseases are also provided.

The administration building contains not only the offices of the institution, but also the accident department, the admitting department, and, in the second story, a thoroughly equipped operating department and medical treatment rooms.

The ward unit is planned to eliminate,

as much as possible, the general noise of the hospital, and to give an abundance of open-air balconies. The private ward unit has a large open-air ward on the second floor.

The isolation building is so planned that patients can be treated individually, after the manner of the Pasteur Hospital at Paris. (See description in Chapter VIII.)

CHAPTER II.

ADMINISTRATION DEPARTMENT.

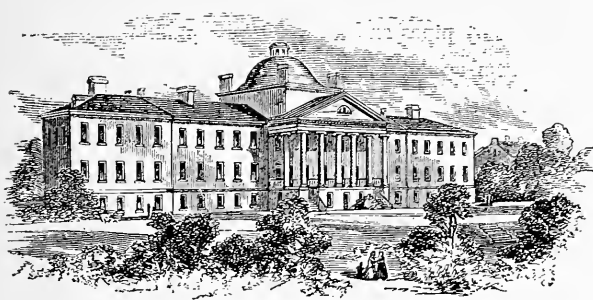


FIG. 8. MASSACHUSETTS GENERAL HOSPITAL.
(From an old wood cut.)

Whether it is a large institution or a hospital of twenty beds there must be headquarters for the administrator or director. This department may vary from a single room to a vast building with admitting rooms, waiting rooms and staff rooms.

From careful observation, it would seem desirable to have the administrative unit the center through which all patients (except stretcher cases) and all their friends shall pass, and where the general business of the institution shall be conducted.

The entrance to this department should be carefully studied from the psychological standpoint, with reference to the effect on the would-be patient. It should be so plainly indicative of its purpose that there can be no hesitation as to where to go first for further direction. The information desk must be plainly in evidence and at this desk should be every facility for answering questions.

Waiting space should be provided for visitors who may come in numbers before the visiting hour. There should be offices of the superintendent, admitting officer, bookkeeper, and superintendent of nurses; the staff and board room, and the medical library. The sleeping and sitting rooms of the house staff and internes can be located in this department building.

In the smaller hospital, the laboratories and Roentgen-ray, the autopsy and lecture rooms, and at times the kitchen de-

partment work out most satisfactorily in this unit.

To show that a hospital can be successfully run without a so-called administration building, it will be noted that the *Massachusetts General Hospital*, one of the oldest in the country, built by Bulfinch in 1821 (Fig. 8), did not have an administration building until 1916; so that, with the hundred years in which to study the needs, it is not surprising that the plan is well-nigh perfect (Figs. 9, 10).

To the entering visitor, the broad marble information counter at once invites confidence; and with the ample waiting-room in the center and the various offices of the institution around the perimeter, one is not apt to lose his way.

The plan is self-evident. The casualty entrance from the same court comes into the basement (Fig. 1), where there are minor operating and treatment rooms. In the upper stories are the rooms of the staff.

At the *Peter Bent Brigham Hospital* (Fig. 5), the problem is worked out on a more palatial scale. In the great rotunda (Fig. 13), the circular information desk in the center is evidently the center of information. The offices of the superintendent and his assistants, and that of the superintendent of nurses, as well as the admitting and examining rooms, are grouped around the rotunda. In the basement are located the Roentgen-ray department and the pharmacy. The central location of this building, connecting as it does the approach to all departments of the institution, simplifies the problem of surveillance.

At the *Ohio Valley General Hospital* (Fig. 15), which is a block-type, self-contained building, the ground and first stories are set aside for administration and domestic purposes. The main and ambulance entrances, the laboratories and treatment room, the out-patients'

PLAN OF FIRST FLOOR

- 1 Main entrance to Hospital
- 2 Information office
- 3 Stairs to public toilet for men
- 4 Waiting room for patients to be admitted
- 5, 6, 7, 8, 9, 10 Telephone booths
- 11 Admitting Physician's office
- 12 Outside corridor to yard
- 13 Record Clerks' office
- 14 Corridor to Main Hospital
- 15 Cashier's office
- 16 Elevator
- 17 Bookkeeper's vault
- 18 Bookkeeper's office
- 19 Office of First Assistant Resident Physician
- 20 Office of Resident Physician
- 21 Trustees' room
- 22 Private toilet
- 23 Cleaners' closet
- 24 Clerks' office
- 25 Office of Superintendent of Nurses
- 26 Office of Assistant Superintendents of Nurses
- 27 Office of Assistant Resident Physicians
- 28 Telephone switchboard room
- 29, 30 Reception rooms
- 31 Office of Assistant Resident Physician
- 32 Parcel room
- 33 Main waiting room for visitors
- 34 Stairs to public toilet for women

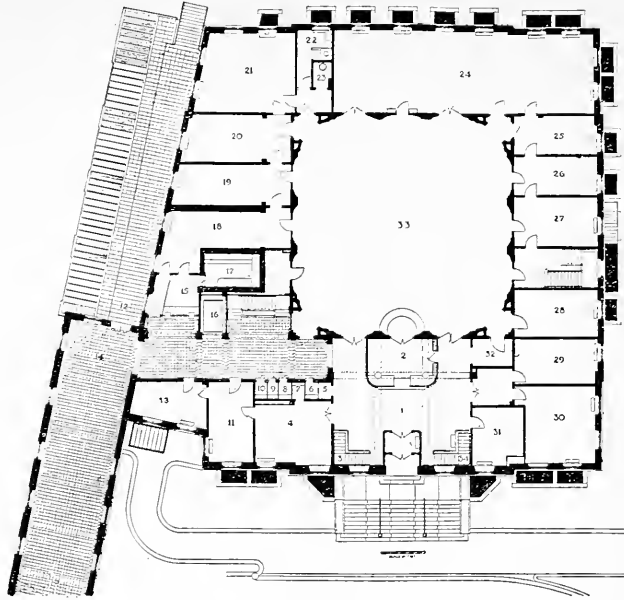


FIG. 9. MASSACHUSETTS GENERAL HOSPITAL. PLAN OF FIRST FLOOR,
ADMINISTRATION BUILDING.
Coolidge & Shattuck, Architects.

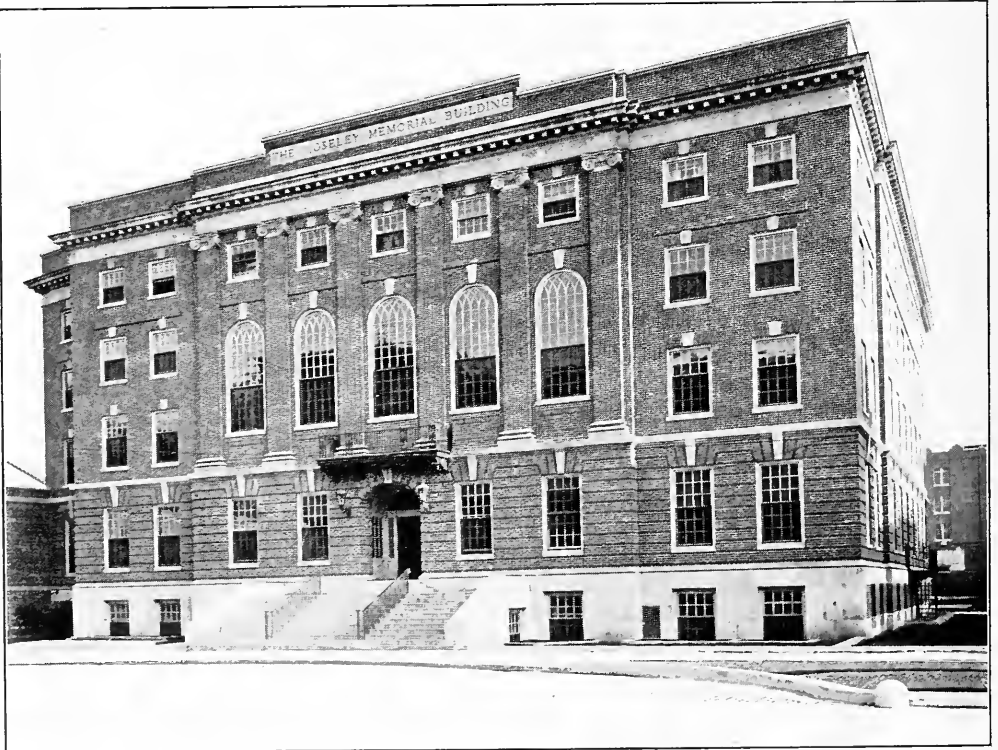


FIG. 10. MASSACHUSETTS GENERAL HOSPITAL. EXTERIOR,
ADMINISTRATION BUILDING.
Coolidge & Shattuck, Architects.

PLAN OF BASEMENT FLOOR

- 1 Corridor to ambulance entrance
- 2 Isolation room
- 3 Dark room
- 4, 6, 7, 11, 12 Operating and examining rooms
- 8 Air chamber
- 9 Spill room
- 10 Covered incline to possible future buildings
- 13 Ward service room
- 14, 15 Male and female emergency wards
- 16 Ward kitchen
- 17 Linen room
- 18 Blanket-warming room
- 19 Sterilizing room
- 20 Instrument room and medicine closet
- 21 Storage vault
- 22 Disinfecting room
- 23 Staff dressing room
- 24 Tunnel under Fruit St., to Nurses' Home
- 25 Women employees' rest room
- 26 Women employees' dressing room
- 27 Patients' toilet (women)
- 28 Apparatus room
- 29 Public toilet for women
- 30 Storage
- 31 Public toilet for men
- 32 Cleaners' closet
- 33 Patients' toilet (men)
- 34 Emergency-ward bathroom
- 35 Dressing room for men employees
- 36 Emergency-ward office
- 37 Entrance for ambulatory patients
- 38 Central clothing room
- 39 Elevator

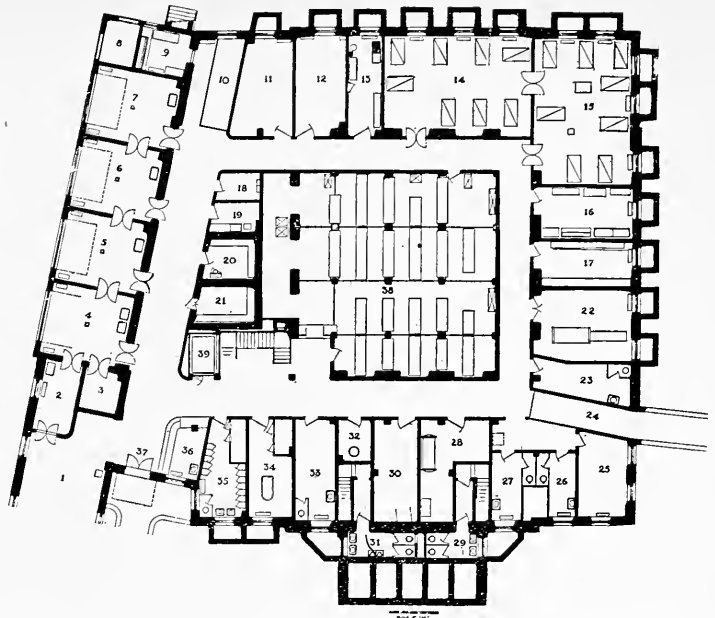


FIG. 11. MASSACHUSETTS GENERAL HOSPITAL. MOSELEY MEMORIAL (ADMINISTRATION) BUILDING.

Coolidge & Shattuck, Architects.

and isolation rooms are on the ground floor (Fig. 53), while the main administrative offices, the internes' quarters, the kitchen and dining rooms are on the first

floor (Fig. 17). This concentrates all of the non-profit-bearing portion of the building near the ground and the less interesting outlook.



FIG. 13. PETER BENT BRIGHAM HOSPITAL. VIEW IN ROTUNDA.

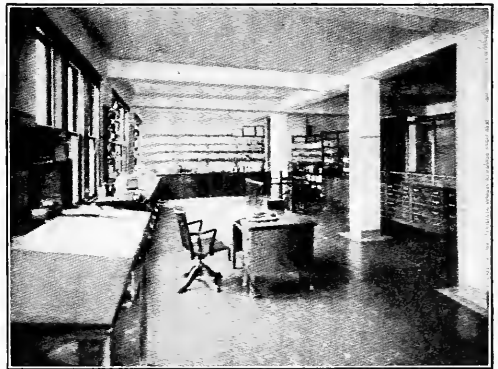


FIG. 14. PETER BENT BRIGHAM HOSPITAL. VIEW OF PHARMACY.

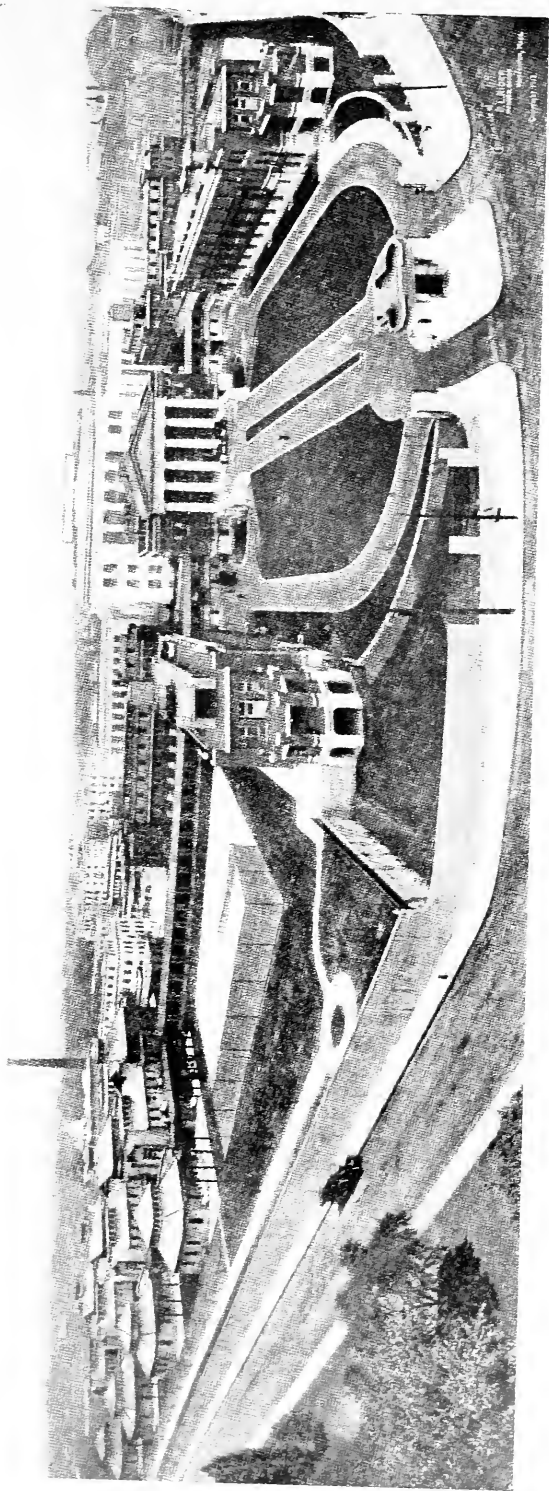


FIG. 12. GENERAL VIEW, PETER BENT BRIGHAM HOSPITAL, BOSTON.
Codman & Despradelle, Architects.



FIG. 15. GENERAL VIEW, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

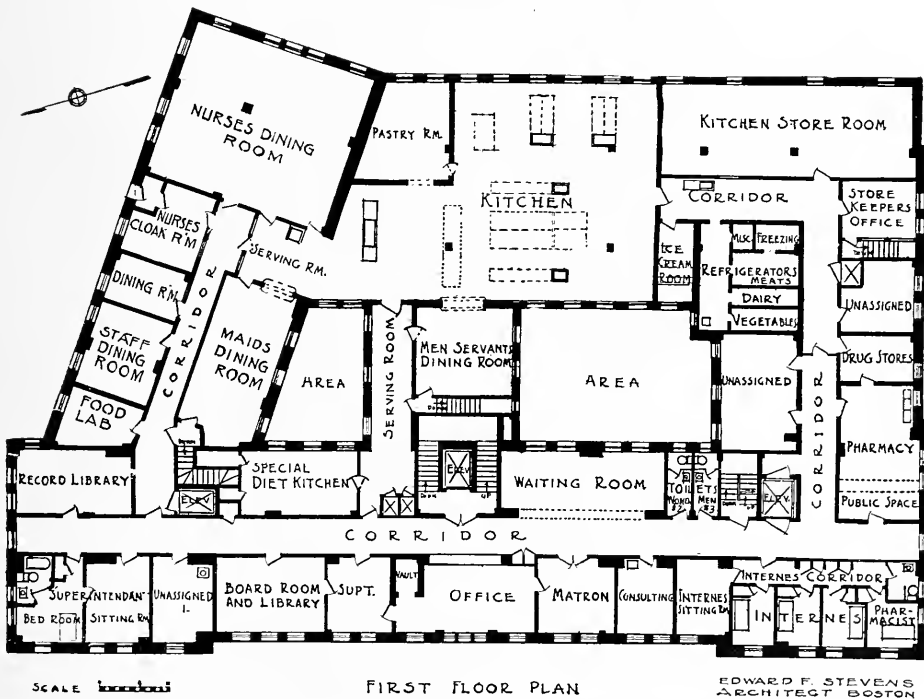


FIG. 17. PLAN OF FIRST FLOOR, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

CHAPTER III.

THE WARD UNIT.

The subject of the ward unit has been discussed by so many able writers on hospital planning that one hesitates to say more on the topic; still, the ward unit is really the keynote of the hospital, since it is here that the patient for whom the institution is built, lives, eats, sleeps, and spends his weary hours of convalescence. We should, therefore, never cease to study the best methods of filling those hours with as much comfort as possible; how to serve him with palatable food; how to provide him with fresh air and sunshine; and how to guard him

from undue noise and from the excitement caused by the workings of the hospital.

The planning of the ward unit, whether in a hospital of one hundred or one thousand beds, presents the same problem—*how best to care for the patient*. After more or less careful study of hospital buildings in Europe and America, after consultation with many of the leading hospital authorities, and after living in the hospital and seeing the operation and treatment, it appears to the writer that there are certain fundament-

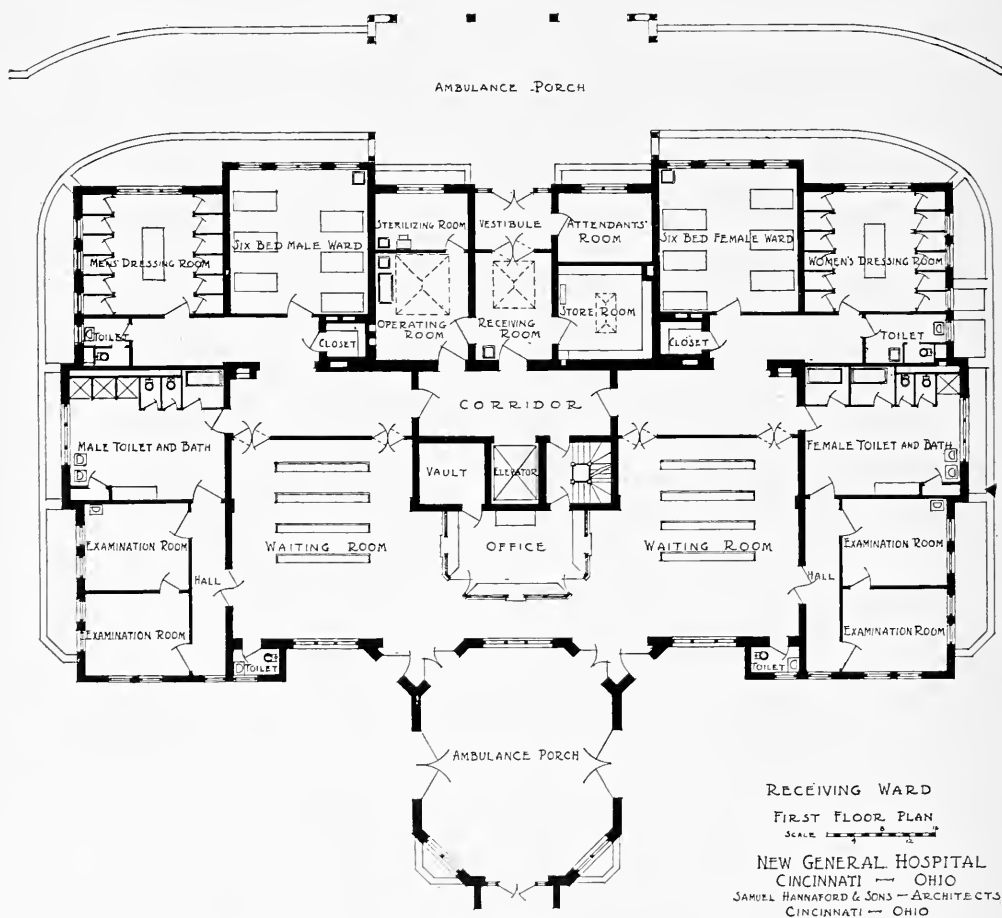


FIG. 18.

als which every ward unit should possess—i.e., every ward unit of a general hospital where the surgical, the usual medical, and special cases are treated, or where the general run of cases are cared for. These essentials of planning can be classed under two heads:

(a) *Comfort of Patients.* The comfort and care of the patients are invariably the first things to be considered. Around this center—the *patient*—we build our institution. If the supplying of more light, better air, and freedom from disturbing noises will add to the comfort and hasten the convalescence of the patient, then these things must be provided.

(b) *Accessibility of Service.* The utility rooms should be so near and so well equipped that the patient need not be called upon to wait for service. At the same time, these service rooms should be so planned that the necessary noises therefrom will not be a menace to speedy convalescence.

The ward unit should be planned for the *particular class of disease* which is to be treated in it. The conditions which govern the treatment of acute surgical patients are different from those governing chronic medical cases. The ambulatory tuberculosis patient needs different accommodations from the patient suffering with the same disease in an advanced form; the child from the adult; the contagious from the psychopathic case.

There are a few essentials applicable to all classes of cases. Whatever the case (with a possible exception of eye cases), the ward or bed of the patient should be so placed that it is possible to have *sunshine* in the room and near the bed some part of the day. All necessary inside doors and all doors or windows giving access to porches should be designed *wide enough* for the patient to be moved in his bed without any change and without any discomfort or inconvenience, to any part of the building, porches, or roof.

As to the *number of beds* to be placed in a ward, authorities differ very much and local demands vary widely. The best authorities abroad believe that not more than sixteen, or, at the most, eigh-

teen patients should be in one room, and some think that these should be subdivided for a better segregation.

In *wards*, every patient should have, when all windows and doors are closed, at least one thousand cubic feet of air. If we consider the height of the ceiling twelve feet, each patient should have not less than eighty-three square feet of floor space—one hundred is better. The height of the ceiling may depend upon the character of the disease being treated, but any height above twelve feet is unnecessary and is of little use in the purification of the air, since the breathing line is about three feet from the floor. On the other hand, for appearance's sake, a ward of more than ten beds should not be less than ten feet in height.

Where wards are of any considerable size, there should be provided nearby one or more "*quiet*" rooms for delirious or dying patients.

Every patient should have at least semi-privacy and some place in which to hide the "household gods" which he may have brought with him.

Many of our modern hospitals, for economy's sake, have a flat roof; and some of them use this roof to a limited extent for the care and treatment of patients. These flat roofs should be used not only as an observatory but, if partly covered for protection from storms and intense heat and partly open to the direct rays of the sun, a patient may be given open-air treatment. The regular ward service of toilet, sink room, serving kitchen, and linen and supply room should be provided here.

In Europe the *day room* or convalescent room is considered by the Government so important that every hospital is compelled to provide one for each ward or group of private rooms, allowing a little over nine square feet for each patient, thus making the area of the day room about one-tenth that of the ward or group of private rooms. In some institutions this room is used for a dining-room. The day room for wards allows a separation of the convalescing patient and the really sick patient, to the advantage of each. The day room for private rooms affords a sitting room where the patients

can receive their friends, gossip one with another, and get away from the monotony of their own rooms.

Every ward unit, or section of private rooms, should have a *serving kitchen* of sufficient size, so placed so as allow quick service of palatable food. The common faults of serving kitchens are that they are too small, and that the arrangement of the equipment is inconvenient. Such rooms should be carefully planned around the equipment, instead of the equipment being adapted to the room after the building is done. The things most used should be located so as to be most accessible; and the things which are needed together should be adjacent, in order to save time and confusion. There should be facilities for keeping food either hot or cold; for cooking small diets; for laying trays for patients, and for washing the china. (See Chapter XVII, on "Equipment.")

It is always necessary to have a separate *utility room* for the emptying, sterilizing, and storage of bed pans and urinals, and such service. The soiled clothes' container may be placed here, unless a clothes' chute is used. Here, also, should be the gas stove for the making of poultices, the sterilizer for boiling instruments, the ice-crusher for ice caps, the small ice storage box, the blanket warmer, etc. A local incinerator is sometimes found valuable for destroying ward waste, and can be placed in this room.

The utility room and the serving kitchen, on account of their constant use, should have the walls tiled to at least four feet in height, and should be located so as to minimize annoyance from noises.

Baths. With acute cases little use is made of the bath tub, so that in a general surgical or medical ward only a limited number is needed, perhaps one to fifteen or twenty patients.

In tubercular wards, simple bathing facilities should be provided, both tub and shower, since bathing usually forms a part of the treatment.

For departments where patients need assistance in taking their baths, the tub should be set high above the floor.

In children's wards where the bath is always given by a nurse, the high, shal-

low slab or tub, with spray, should be used.

For the ward entrance bath, a shallow tub where the spray can be used has been found desirable. (See Chapter XV, on "Plumbing.")

The necessary toilets must be provided. A small laboratory is a great convenience. For surgical wards, a properly equipped surgical dressing room is almost a necessity; it saves much dirt and many odors in the ward, and adds to the comfort of other patients.

Where there are many private patients, there should be a small room with sink where cut flowers can be taken at night and rearranged in the morning; this prevents the clutter which one finds in the bath or sink room on morning rounds.

For the convenience of doctors and attendants, lavatories should be placed in every room or in the corridors adjoining. Drinking fountains, preferably of the "bubbling" type, add to the comfort of both patient and nurse.

From a careful investigation of modern ward units for the care of general cases—of eighteen to twenty-four beds per floor—it has been found that an average of twenty-five per cent of the area of a floor is needed for staircases, elevators, and utilities, and twenty-five per cent for corridors, leaving fifty per cent for patients. Circumstances will, of course, change this proportion. In contagious wards the proportion for utilities will be greater, while in those for incipient tuberculosis it will be less.

There is nothing more disturbing to a sick patient than street noises, the ringing of electric bells, the clatter of dishes, clicking of doors, hum of conversation, the flushing of plumbing, etc. He wants quiet and grumbles if it is denied. The minimizing of hospital noises is one of the architect's problems. It cannot be accomplished by putting legends on the wall, warning the visitor, doctor, or nurse to "keep silence." It must be done by planning. With modern fireproof construction, hard-plaster finish, lack of draperies, and necessary elimination of architectural detail the very walls become sounding boards, which transmit and magnify noises throughout the building.

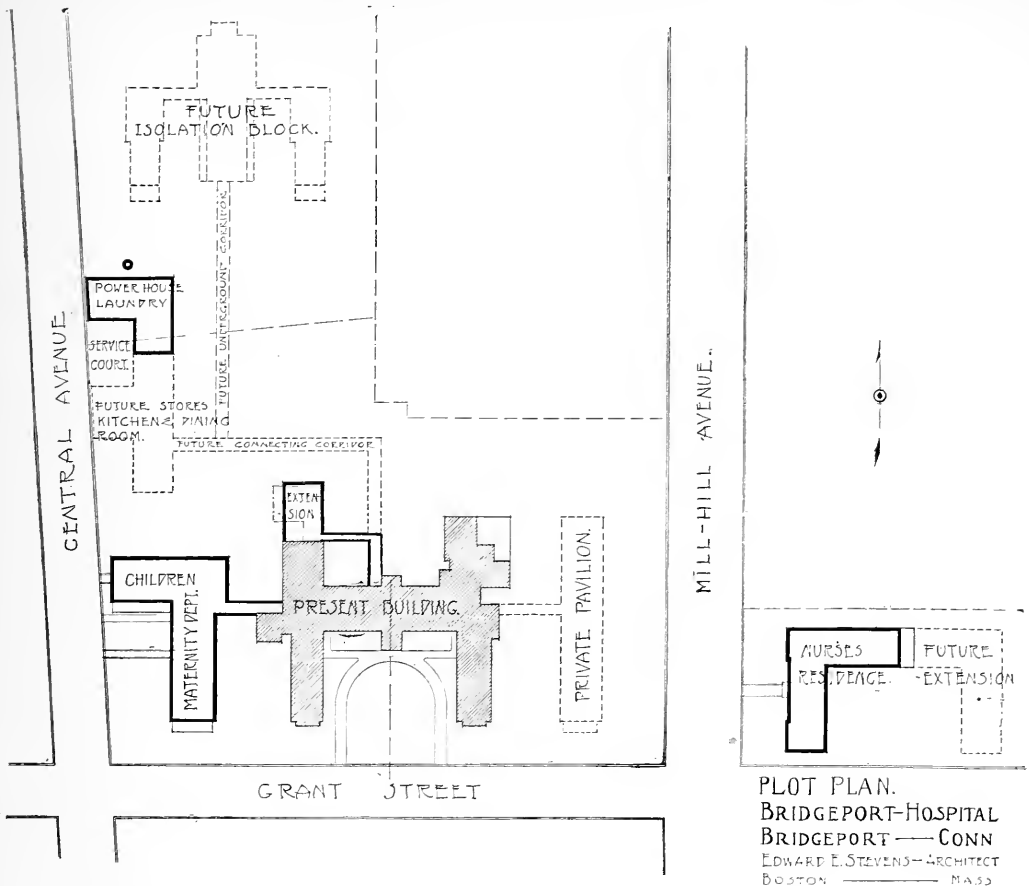


FIG. 19.

Hospitals should be so planned that noises are confined, as far as possible to the localities in which they originate.

Much elevator and staircase noise can be avoided if these are enclosed in one shaft, away from wards or private rooms, with a wide landing in front, shut off from main corridor by a door.

In a well-planned private house, the kitchen is never connected with the living rooms nor directly even with the dining-room; yet in modern hospitals we sometimes find the serving kitchen next to or directly opposite a patient's room or ward, with the clatter of dishes disturbing him many times a day. This is also quite true with other utility rooms such as sink room or public toilets. If these utilities can be segregated, placed at the end, the center, or even around the corner of the ward building, there will

be much greater freedom from these disturbing noises.

In maternity departments, the nursery, the delivery room, and the labor room should be as far as possible from patients' rooms, and should be isolated by at least two intermediate doors. (See Chapter VI, on "Maternity Department.")

The operating department should be well removed from all others, preferably on a separate floor or in a separate pavilion.

Floors which minimize the noise, either of cork or linoleum, should be used in the sick rooms; and noiseless hardware and door checks to prevent slamming, etc., should be considered in the construction of the building.

Outside noises, such as street cars, railroads, traffic on the pavement, manufacturing plants in the vicinity, etc., can

be avoided only by proper location. This should receive serious consideration.

A few examples of both the European and the American ward units will serve

to illustrate some of the important points.

EUROPEAN WARD UNITS.

It will be noticed that in the *Barmbeck*

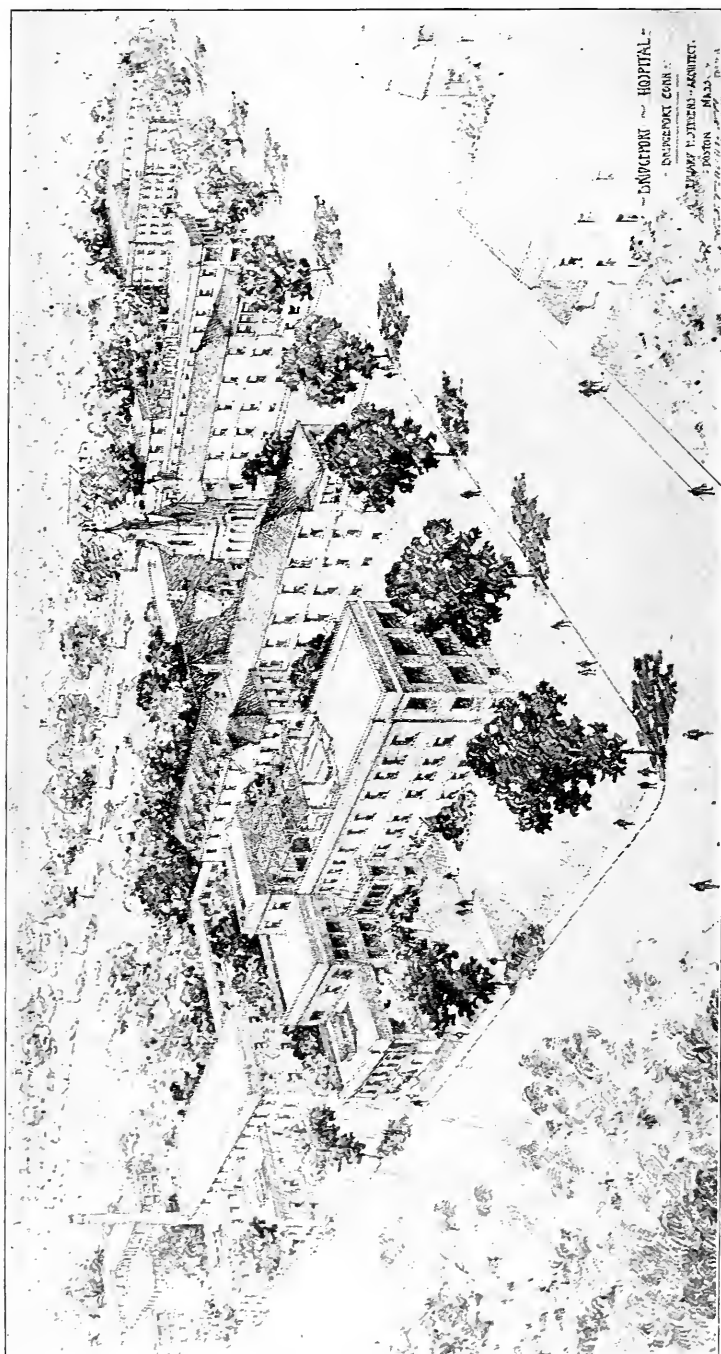


FIG. 19A. BIRD'S-EYE VIEW OF BRIDGEPORT HOSPITAL DEVELOPMENT.
Edward F. Stevens, Architect.

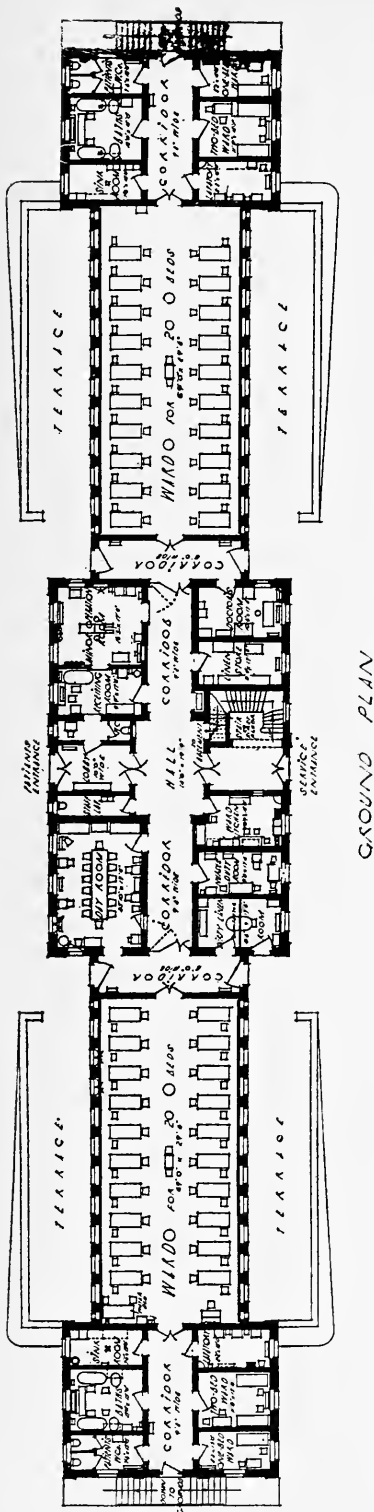


FIG. 20. GROUND FLOOR PLAN OF SURGICAL PAVILION, RUDOLPH VIRCHOW HOSPITAL, BERLIN.

the largest ward is sixteen beds (Fig. 2); that from each ward is a *liegehalle* or airing balcony; that each ward has its *tageraum* or day room; that the serving kitchen, sink rooms, and toilets are removed from the vicinity of the patients' rooms; and that each ward unit has a laboratory and a surgical dressing room. This ward building proper is two stories in height, with room on the third floor for a few nurses for quick call.

The operating building of this hospital of fifteen hundred beds has but two operating rooms, so that many of the minor surgical procedures are done in the surgical dressing rooms which are in each unit. The Barmbeck unit is an unusually good and complete one.

The *Rigs Hospital* ward unit (Fig. 21) has much to commend it as worthy of study, for it is in many ways unique. The staircase, elevator, and other noisy equipment are kept at the extreme ends, away from the portion of the building occupied by patients. The serving kitchen, bath and sink rooms are on a cross corridor; the surgical dressing rooms and toilets are at the opposite end of the building. An isolation room and nurses' room are placed in the center.

The ward itself, containing twenty-six beds, is divided into eight sections, each section containing three or four beds. A dividing screen affords privacy to the patients and still allows free access to all parts of the room for the attendants. The screens, only six feet high and raised one foot from the floor, afford the same ventilation as an open ward. Bowls for surgeons' use and medicine closets are placed in each ward.

This is doubtless one of the best developed ward units in Europe.

In the *Bispebjerg Hospital* (Fig. 23), the ward unit is interesting, sixteen beds being the largest ward. The entire design of the group is simple and dignified, and rather different from the stereotyped styles one sees throughout Germany. Professor Nyrop has taken advantage of the natural contour of the land in the use of terraces, steps, and landscape effects.

The details of the various equipment were very carefully devised.

In the *Munich-Schwabing* (Fig. 24)

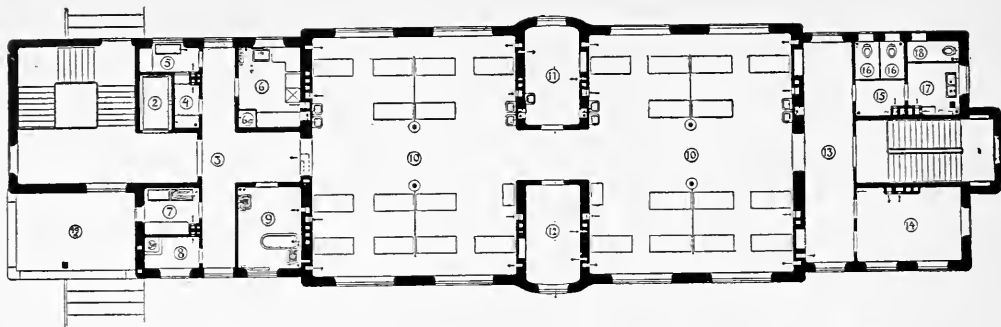
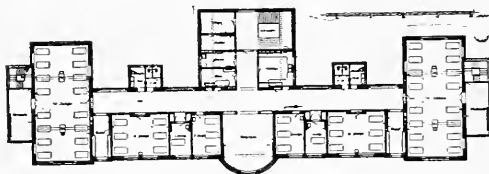


FIG. 21. PLAN OF WARD UNIT—RIGS HOSPITAL, COPENHAGEN, DENMARK.

unit the largest ward is twelve beds. All wards face the south and have opportunities for wheeling patients into the balconies and into the gardens. The balconies are spacious and comfortable with attractive boxes of flowers decorating them in summer. The service rooms are to the north, also the laboratory and dressing rooms. The day room is to the south, central with the unit.

FIG. 23. BISPEBJERG HOSPITAL, WARD UNIT.
M. Nyrop, Architect.

The admitting department for each ward unit is very complete. The patient comes into room No. 11; his clothes are removed and put into a container of linen which is hung on a truck; he next goes to room No. 12, where he is bathed; to No. 13, where he is given hospital clothes; passes to No. 8, where final examination is made and history completed, and thence to his bed. The elevator at this part of the building is for the convenience of the second-story patients.

AMERICAN WARD UNITS.

The European hospitals are built and supported very largely by the governments. In this country, we have a very different condition. Many of our hospitals are private corporations, and it is generally a question of accommodating the largest number of patients for the smallest amount of money. Our archi-

itects, therefore, are often forced to economize in every way, until the wards in many cases have become almost barracks for the mere housing of people, and the attendants are obliged to put up with the scantiest accommodations.

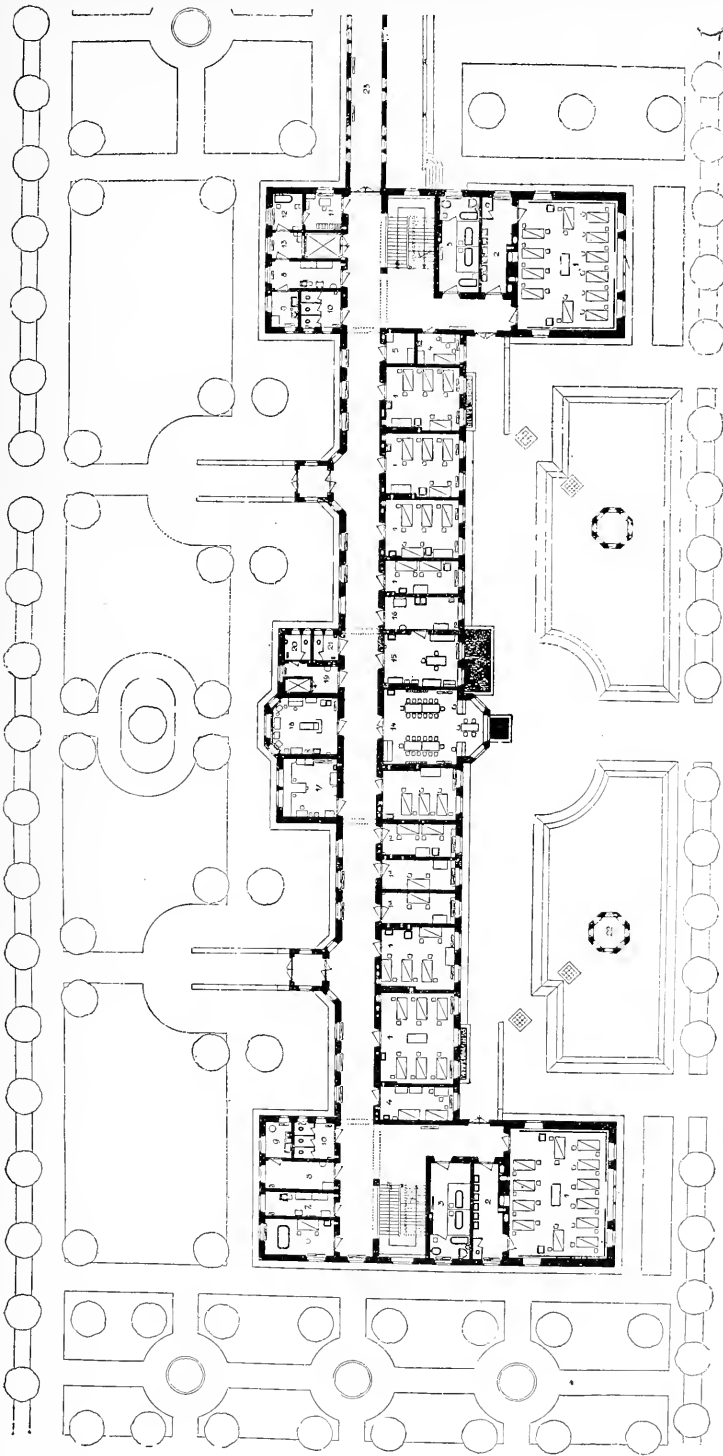
Some of our newer hospitals are rising in scale. Instead of making a number of rooms and leaving it to the administrator to find out later what he can put into these rooms, they are allowing their architects to provide some of the more essential rooms, such as the sink room, a serving kitchen of sufficient size, a surgical dressing room, laboratory, etc.; and are letting him design and plan the equipment at the time he makes the drawings for the building.

The care and thought put upon the working out of the plan of the *Peter Bent Brigham Hospital* (Figs. 25-27), makes it worthy of attention.

The first floor of the ward unit contains two large wards, one of eight and the other of fourteen beds. A cross corridor separates the two wards. Two isolation rooms, with diet kitchen, duty room, baths and toilets, are grouped together on the side of the corridor opposite the main ward. There are, also, a laboratory and a consultation room on this floor.

The staircase and elevator lead directly from the main corridor at the extreme north end of the building.

In the second story there is one large ward of twelve beds, two isolation rooms, duty and toilet rooms. Ample airing balconies or terraces on both floors provide outdoor space for all the patients of this unit.



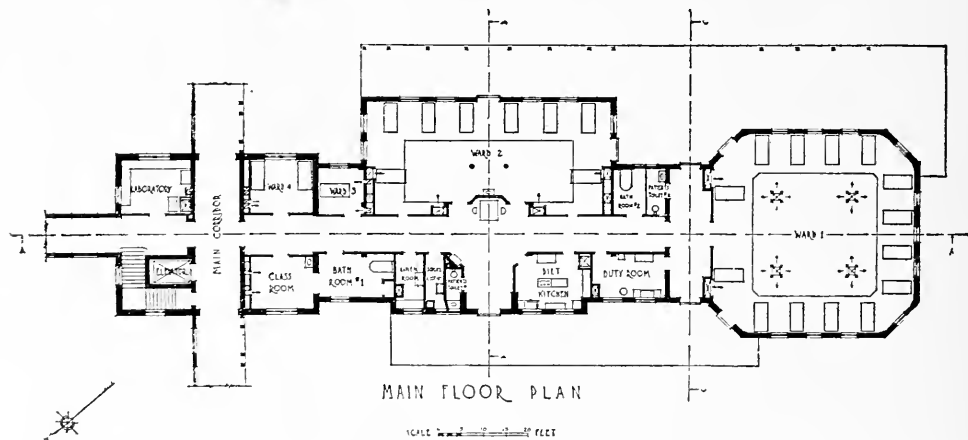
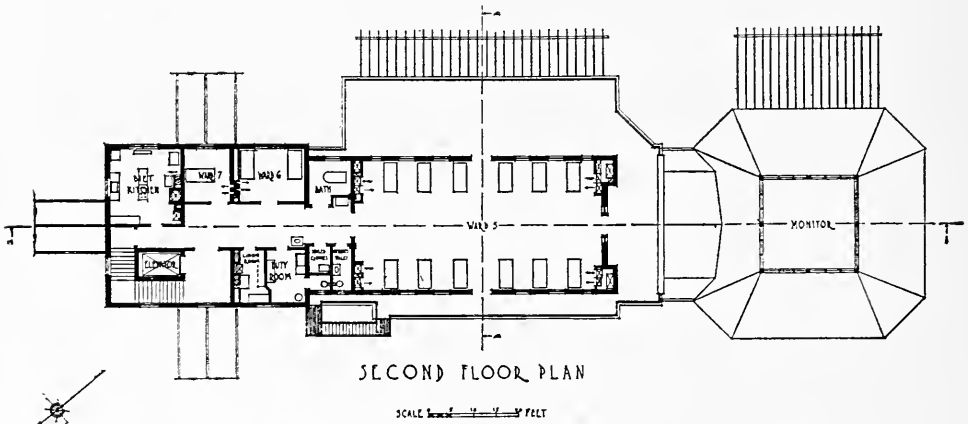
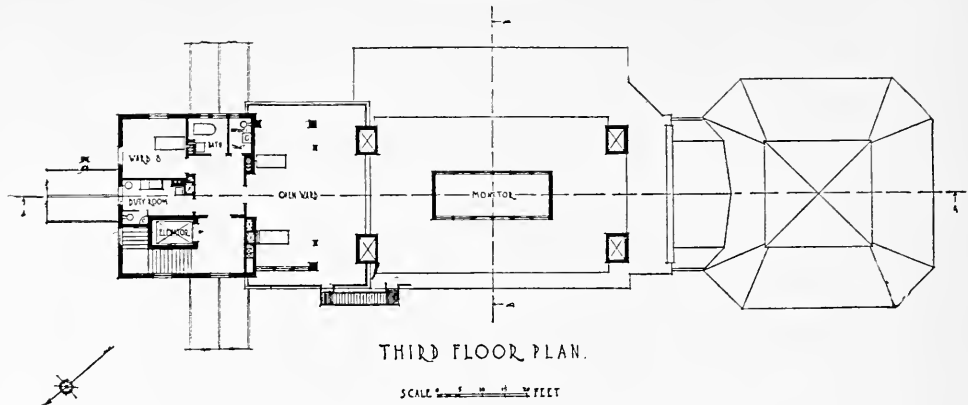
Pavillon für innerlich Kranke, Medizinische Abteilung A. Grundriss des Erdgeschosses.

1. Krankenzimmer. 1a. Isolierzimmer. 2. Waschraum. 3. Krankenbader. 4. Warterzimmer. 5. Gerateraum. 6. Dauerbad. 7. Lageraum. 8. Gerateraum. 9. Fakalentleerung. 10. Krankenaborte. 11. Auskleideraum. 12. Aufnahmeaborte. 13. Ankleideraum. 14. Tagraum. 15. Stationszimmer. 16. Spülküche. 17. Laboratorium. 18. Untersuchungszimmer. 19. Tonneraum. 20. Schwesternaborte. 21. Personalaborte. 22. Luftzuführungshaushen. 23. Verbindungsgang.

FIG 24. PLAN OF WARD UNIT, MUNICH-SCHWABING HOSPITAL, MUNICH.

Richard Schachner, Architect.

Typical Pavilion



FIGS. 25, 26 AND 27. FLOOR PLANS, WARD UNIT, PETER BENT BRIGHAM HOSPITAL, BOSTON.
Codman & Despradelle, Architects.

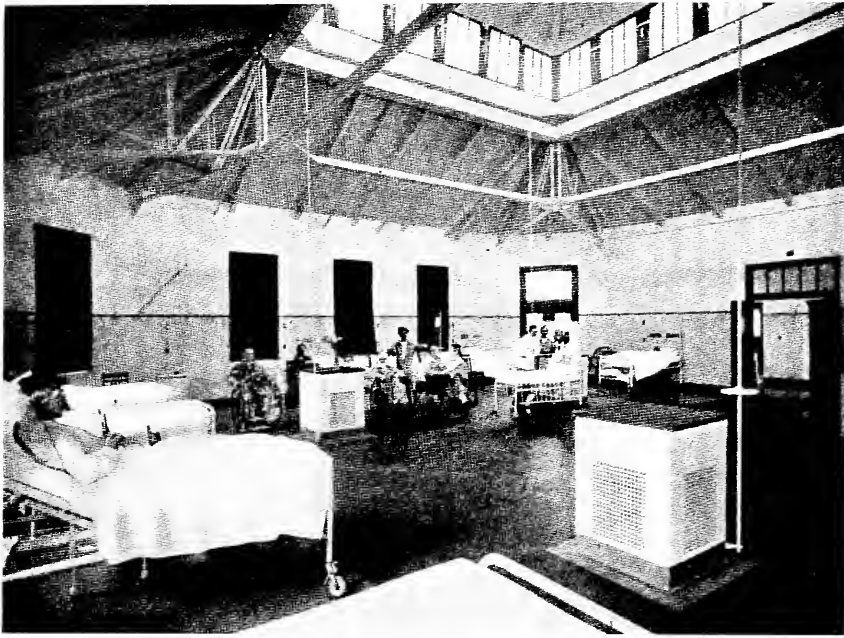


FIG. 28. INTERIOR PAVILION "C," PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.
Codman & Despradelle, Architects.



FIG. 29. INTERIOR OF WARD, PAVILION "C," PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.
Codman & Despradelle, Architects.

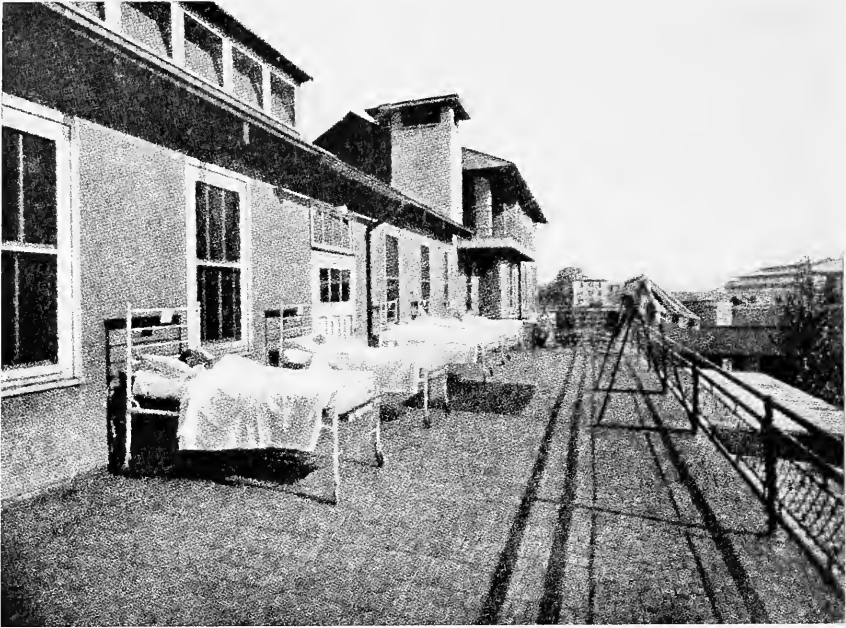


FIG. 30. AIRING BALCONY, PAVILION "C," PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.
Codman & Despradelle, Architects.

The portion of the building containing the octagonal ward (Fig. 28) is but one story in height, and has monitor windows. The main ward, second story (Fig. 29), is also top-lighted.

On the third floor (Fig. 27), there is an open-air ward, with the necessary duty room, toilet, and isolation rooms. This can also be used for contagious cases which may develop in the hospital.

The *Cincinnati General Hospital* shows

the influence of European examples. Dr. Holmes has given much thought to the perfecting of this ward unit (Figs. 31-34).

In this ward unit the nurses' station, while not directly in the main ward, is in such a position that it commands a view of all the ward beds, as well as the doors of the private rooms.

The patients' toilet is entered through a fresh-air cut-off, after the manner of

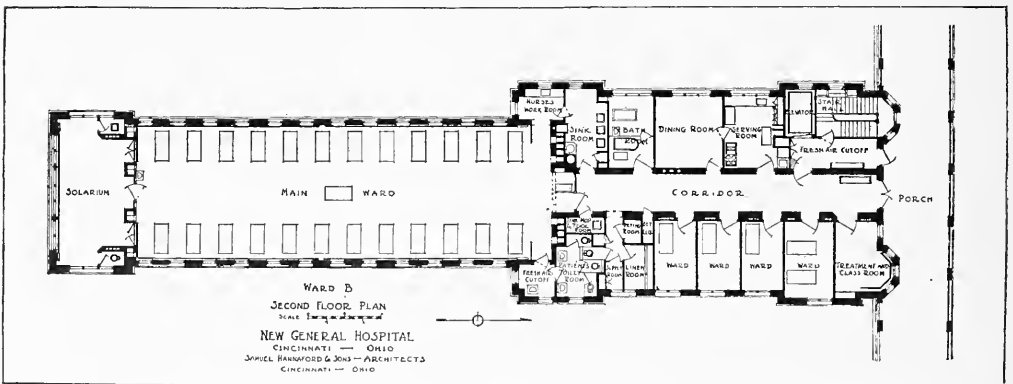


FIG. 31. WARD UNIT PLAN—NEW GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

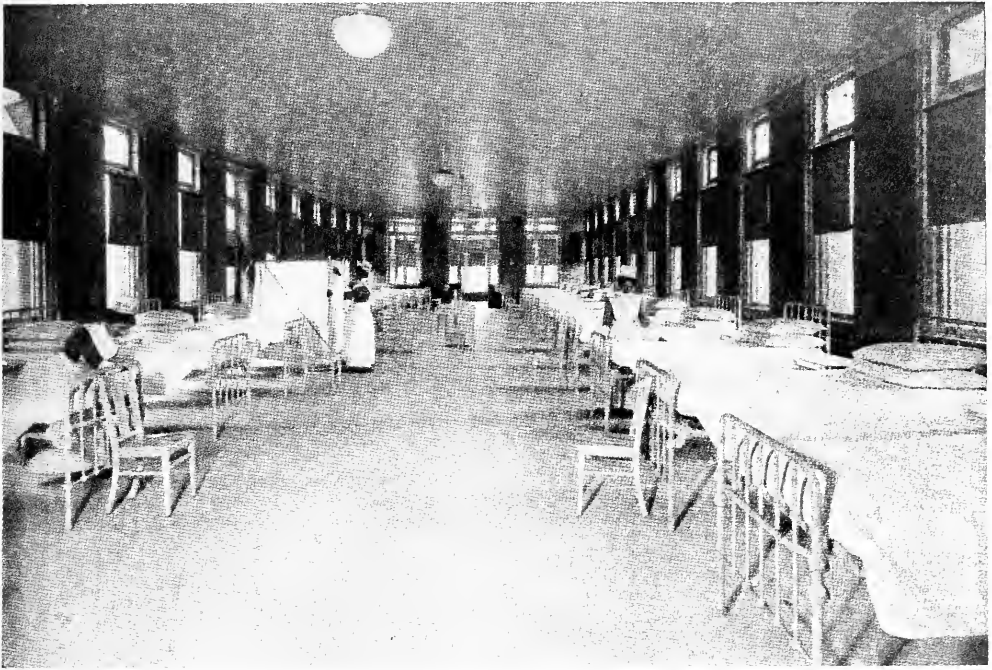


FIG. 32. INTERIOR OF ONE OF THE WARD BUILDINGS—NEW GENERAL HOSPITAL, CINCINNATI, OHIO.

Samuel Hannaford & Sons, Architects.

the best-planned English hospitals. The sink room is entered either through the nurses' work room or directly from the corridor. There are additional toilet facilities connected with the solarium, thus minimizing the work of nurses or attendants.

The utilities, baths, and toilets are grouped together. The entrance to the serving kitchen is near the main stair and elevator corridor. A commodious dining room is provided for those patients who are able to be about.

In the *Henry Ford Hospital* (Fig. 35), the ward unit provides for sixteen beds in the general ward, one two-bed ward and two single rooms. The patients' toilet is entered indirectly from the ward through a fresh air passage. There are also additional toilets, entered from the solarium or day room.

In the six-story building recently erected for the *Harper Hospital* (Figs. 36 and 37), Detroit, an innovation has been introduced into the construction by making eight-foot set-backs in the walls of the main pavilion at the fourth floor so

that the first three stories provide for private rooms on either side of a wide corridor. The upper three stories provide for a ward on each of proper width for administration. This allows for two large airing balconies on the fourth floor, over the roof of the third-story private rooms.

In this plan, also, the utilities are grouped in the center, with a fresh air cut-off between them and the main twenty-two-bed ward. At the end of the large wards toilet rooms are provided, in addition to the general toilet rooms from the main corridor.

For every story there are surgical dressing rooms, and on the private room floors a special room for cut flowers is introduced. The seventh story consists of a large roof ward, with diet kitchen and other utilities.

In the *St. Luke's Hospital*, Jacksonville, Fla., it was planned to have several public ward units (Fig. 40), accommodating thirty-six patients in each building, the largest ward containing but six beds. The entrance is from the open-air corridor at the east, and the utility rooms

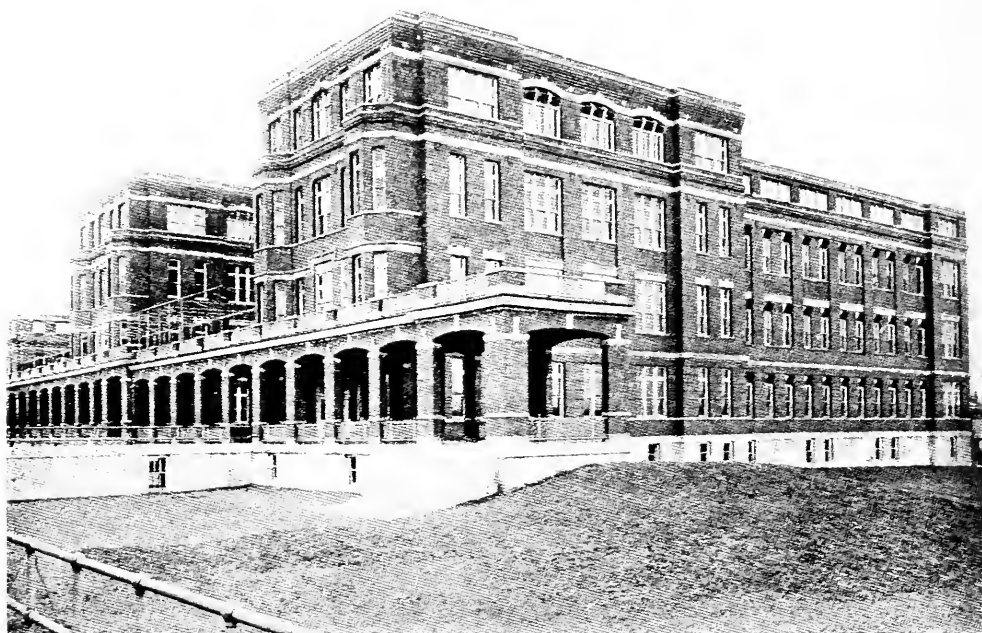


FIG. 33. WARD BUILDINGS "C" AND "B"—NEW GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

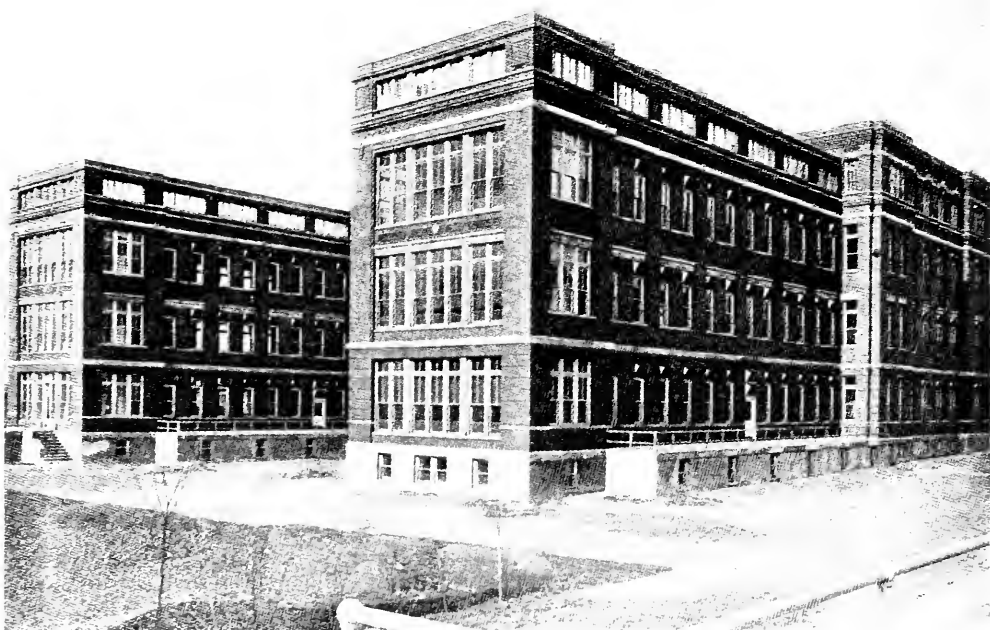
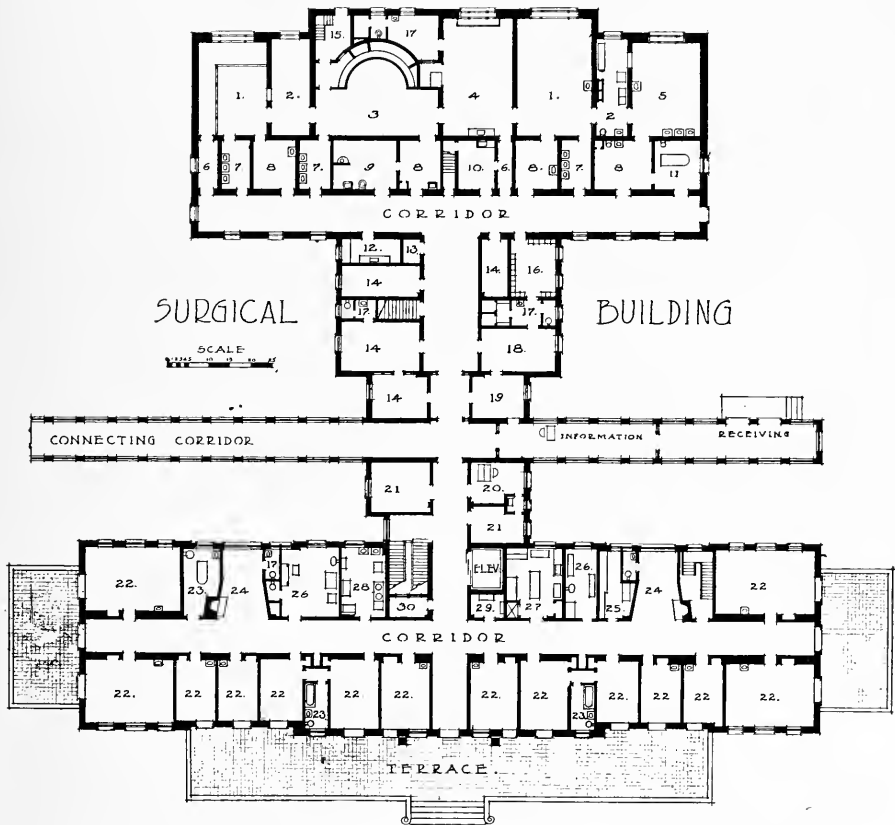


FIG. 34. REAR VIEW. WARD BUILDINGS "J" AND "K"—NEW GENERAL HOSPITAL,
CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.



FIRST FLOOR PLAN

· PRIVATE · PATIENT · BUILDING ·
 · HENRY · FORD · HOSPITAL · DETROIT · MICH. ·

1. Operating Room. 2. Sterilizing Room. 3. Operating Amphitheater. 4. Nurses' Work Room. 5. Emergency Operating Room. 6. Passage. 7. Doctors' Wash Room. 8. Anesthetizing Room. 9. Dark Operating Room. 10. Utility Room. 11. Emergency Receiving Room. 12. Laboratory. 13. Doctors' Phone. 14. Doctors' Offices. 15. Rear Entrance. 16. Doctors' Locker Room. 17. Toilet Room. 18. Waiting Room. 19. Accounting Room. 20. Phone Exchange. 21. Office. 22. Private Room. 23. Bath. 24. Alcove. 25. Linen. 26. Utility. 27. Diet Kitchen. 28. Dressing Room. 29. Head Nurse. 30. Doctors' Phone.

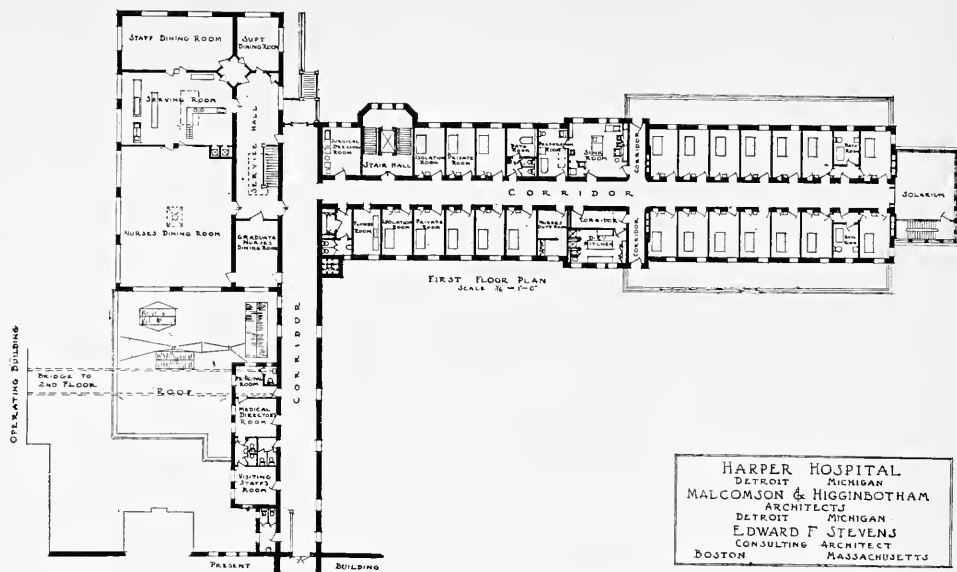


FIG. 36. HARPER HOSPITAL, HUDSON MEMORIAL, DETROIT, MICH.
Malcomson & Higginbotham, Architects, Detroit, Mich.
Edward F. Stevens, Consulting Architect, Boston, Mass.

are grouped around this entrance, with the doors to sink room, serving kitchen, nurses' toilet, and elevator opening from the cross corridor, minimizing the noises from these disturbing elements. Two large airing balconies are provided on each floor.

In the private pavilion of the same hospital (Fig. 38) a similar arrangement is secured so far as the utilities are concerned. The units are smaller, a three-bed ward being the largest, most of the space is utilized for single rooms. In this plan, the open-air ward is introduced on the second floor, being connected with

the main corridor and served from the main utility rooms. Both this building, and the public ward unit are but two stories in height.

In the *Youngstown Hospital* at Youngstown, Ohio, the ward unit (Figs. 42 and 43) is not unlike some of the others described, providing for a central location of the utilities, with sufficient isolation for the rooms and wards to minimize the effect of noises upon the patients.

The first floor of this pavilion is used only for ward patients; and the second, third, and fourth floors for private pa-

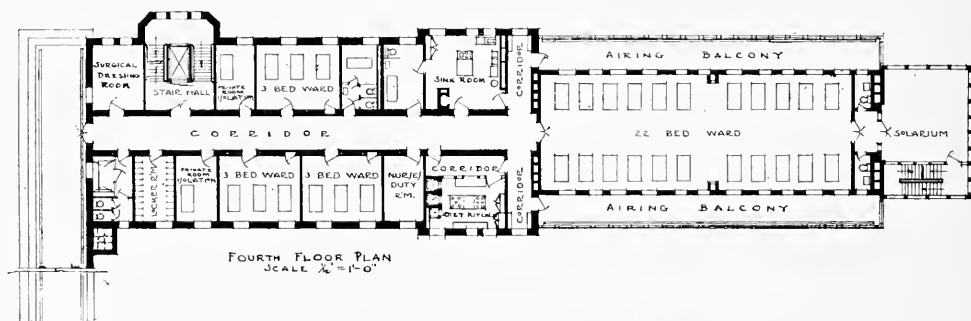


FIG. 37. HARPER HOSPITAL. HUDSON MEMORIAL.

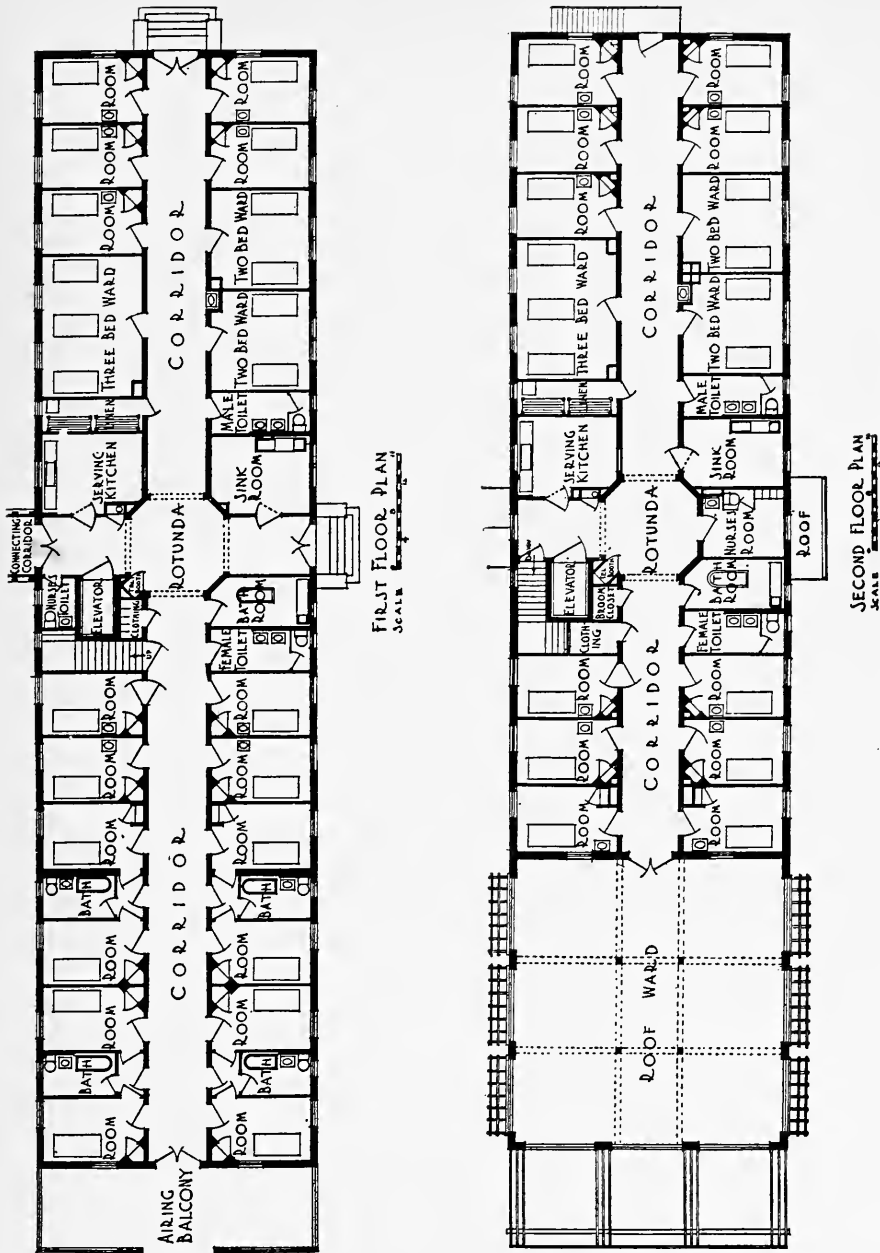


FIG. 38. PRIVATE WARD BUILDINGS, ST. LUKE'S HOSPITAL.

tients. On the north there is a day room on each floor, and a large roof ward on the fifth floor.

The ward unit used in the maternity and children's department of the *Bridgeport Hospital* at Bridgeport, Conn., is one which will apply to any general ward

(Fig. 44), and is described under the chapters on maternity and children's hospitals. (See also Figs. 45-49.)

This unit, designed on the Rigs Hospital ward plan, affords a better division of patients than almost any other plan of the same area. It is arranged in groups



FIG. 39. VIEW OF PRIVATE WARD BUILDING—ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect; Mellen C. Greeley, Associate Architect.

of four beds, allowing one large window for each group. The division between the groups is made by a permanent screen, upon which are placed the connections for the nurses' calls and the electric lights.

The utilities and quiet room are planned for the most efficient service.

The *Galloway Memorial Hospital* at Nashville, Tenn. (Fig. 50), consists of a group of three buildings, the first one to be erected being in the center, and is composed of an operating pavilion, charity ward pavilion, and private ward pavilion.

In the operating pavilion the basement floor is to be used for administrative purposes and to the rear an ambulance porch shelters patients being received. The second floor consists of the operating department, together with dressing rooms, sterilizing, anaesthetic and recovery rooms, and all other modern arrangements necessary to a thoroughly equipped operating department. The third floor is similarly fitted for a charity operating department, and is furnished in every

particular with the same conveniences and advantages that the pay service will afford.

Ward D is for charity patients only. The basement floors are used for consultation, emergency beds and a free dispensary. The second and third floors hold one hundred charity beds, conveniently arranged, with one to twelve beds per room. The roof garden, to which the patients have access for fresh air and sunshine, is reached by an elevator.

In Ward B, the basement floor for the present will furnish space for kitchen, dining-rooms and domestic service. The second and third stories contain thirty-two rooms for pay service; and the fourth floor, in the form of a roof garden, furnishes outing space, sunshine and fresh air for the patients below and can be reached by means of an elevator from the wards.

In the *German Hospital* in Chicago (Figs. 51 and 52), which is of the L-shape plan, the architects have designed the private and public wards in different

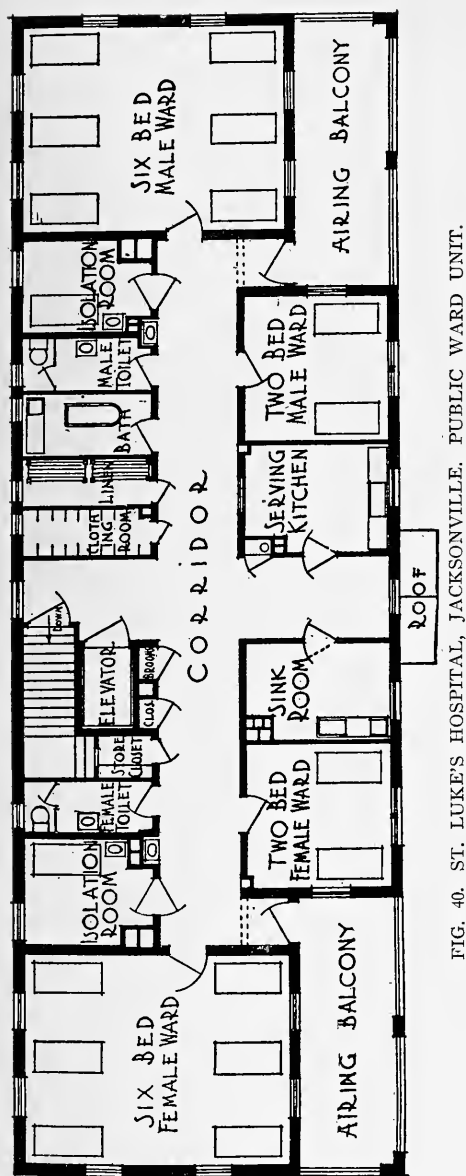


FIG. 40. ST. LUKE'S HOSPITAL, JACKSONVILLE. PUBLIC WARD UNIT.

arated from the tub, making it possible to use the suites as private rooms. The maternity and operating departments are on the fourth floor, with proper shut-offs and segregation of the noisy portions of the maternity department.

The *Ohio Valley General Hospital* (Fig. 53) was built on one of the many hills of West Virginia, which made it necessary to utilize the various grades of the streets surrounding the site. An almost precipitous cliff at the north determined the outline of the north wing.

The hospital is a block type, self-contained institution. It is planned to care for all departments of a general hospital—out-patient, accident, surgical, medical, maternity, children's, contagious—as well as for the segregation of colored patients. It is also provided with heating, lighting, and refrigerating plants, as well as a distilling plant for distilling all the drinking water and that used in connection with the surgical departments.

In planning this institution, it was decided to have no wards larger than eight beds, as a better segregation of cases could be obtained than by using large wards. This being a general hospital, both private and charity cases are cared for.

Provision is made on every floor for airing balconies (Fig. 54) so that all patients can be wheeled into the open when desired. A large roof ward is provided on the upper story.

The combining of the contagious department (Fig. 158) with the general hospital within the same walls is practiced here without any serious complications or cross infections.

The *Macon Hospital* (Fig. 55) like many another institution throughout the United States, found that its work was deficient on account of lack of better facilities for the care of the sick; additional land was secured in two different directions and the development of the institution has been attempted. The old buildings, A, B, and C, have been remodelled and put into working condition. The ward unit in Building B has been rearranged on the "Rigs" type, providing for sixteen beds, with quiet rooms

sections of each floor, giving an excellent chance for segregation and treatment of diseases. In the public ward portion, six-bed wards are the largest. The placing of the elevator and staircase in a separate space, and grouping about these the utility rooms, must tend to minimize disturbance from the noises. Each floor is provided with two suites, with bath and toilet connecting, so arranged, however, that the waterclosets and bowls are sep-



FIG. 41. ST. LUKE'S HOSPITAL, JACKSONVILLE. CORRIDOR AND PUBLIC WARD UNIT.

and utilities, while the old children's ward has been made into a modern serving kitchen. The old staircases and general partitions in A, B, and C have been largely retained, but the utilities have been enlarged.

Pavilions D, E, and F are new. Pavilion D is practically for private patients and consists of private rooms and the general utilities. Pavilion F is designed for colored patients, who in southern sections, of course, must be segregated from the white patients. The service building, E, contains the kitchen, dining-room, laundry, power plant, and garage, and is located centrally with respect to the whole group.

The ground floor of the pavilion for negroes, F, is devoted to an out-patient department, which will be described in another chapter.

The third floor of Pavilion D consists of children's and operating departments, which are described in their proper places. The roof ward (Fig. 56) is provided with ample facilities for out-door treatment, and is connected directly with the serving kitchen, elevator, and staircase.

The *Mansfield General Hospital*, at Mansfield, O., (Fig. 57) is another ex-

ample of the self-contained type, with all departments in one building. In this hospital the attempt has been made to segregate, so far as possible, the divisions of male, female, children's and maternity; and with the T-shape plan which is here adopted this was found to be a comparatively easy problem to solve. A central serving kitchen serves all of the three different departments on each floor. A separate sink and toilet room, however, is provided in each unit. The nurses' station is located in the center, from which point it is possible to observe the three wings of the building. The main offices are located on the first floor; and a small out-patient department, a medical treatment, Roentgen-ray department, the heating plant and the kitchen plant are located on the ground floor. The contour of the site selected allows for good lighting in all departments.

On the second floor (Fig. 58) are located the maternity department and private rooms and suites; and shut off and isolated from the rest of the building is the operating department. The maternity delivery room is placed within the operating section, making it possible to utilize the sterilizing room, the doctors' waiting-room, and the other

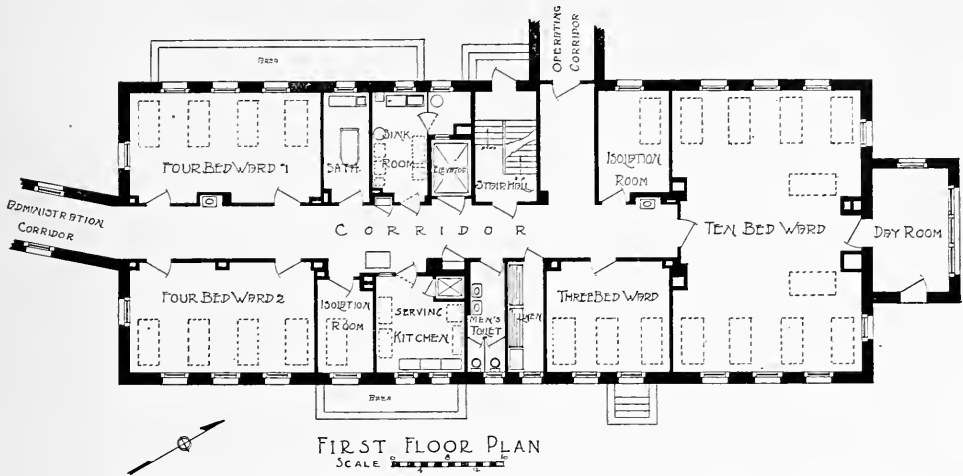


FIG. 42. YOUNGSTOWN HOSPITAL, TOD WING.

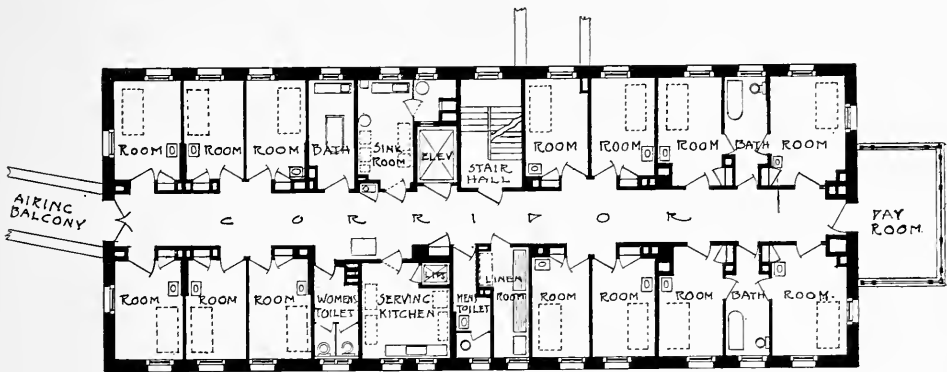


FIG 43. YOUNGSTOWN HOSPITAL, TOD WING. TYPICAL FLOOR PLAN.

equipment of the operating department in connection with the obstetrical work.

The recent addition to the *Hamot Hospital*, at Erie, Penn., consists of a seven-story fireproof building (Fig. 60) which is devoted largely to private rooms and surgical department of the hospital. This pavilion is designed as the first unit of an entirely new Hamot Hospital, but is complete in itself. In this ward unit, all the utilities are grouped at one end of the building; the stair hall and elevator are shut off from the main corridor; the sink room and serving kitchen are at the extreme end of the building. A large solarium and airing balcony are on the southwest end of the building on each floor. Fig. 59 shows a typical floor.

In the *San Francisco Hospital* (Fig. 61), the ward unit has some interesting features. The main ward, while rather larger than some authorities would naturally permit, is well-lighted and ventilated. The architect has introduced into this ward unit the old English toilet tower which, while having excellent hygienic reasons for its existence, has a tendency to darken more of the main ward than if the toilet were placed at either end of the long ward. While the toilet tower up to within a few years was used very generally in all English hospitals, some of the best English authorities today are not advocating it.

The utilities of this ward unit are excellently arranged. The splendid day

room for patients, away from the ward unit itself, is most attractive. Each unit has its own surgical dressing room and its own laboratory, as well as the quiet rooms and necessary toilets.

In the *Illinois Central R. R. Hospital*, Chicago, the ward unit is somewhat unusual, as there are no large wards. The greatest number of beds in any ward is four, while the majority of the rooms are for individual patients.

Like some of the other hospitals described, the basement and first floor are

small out-patient department, with waiting and treatment rooms; also rooms for the internes and chief surgeon.

The kitchen, scullery, diet kitchen, disinfecting room, mortuary, etc., are located in the basement.

The ward utilities are sufficiently isolated from the public corridor. The elevator and staircase-hall are placed in a separate tower.

On the third floor (Fig. 63) is located the operating suite, consisting of three operating rooms, nurses' work room,

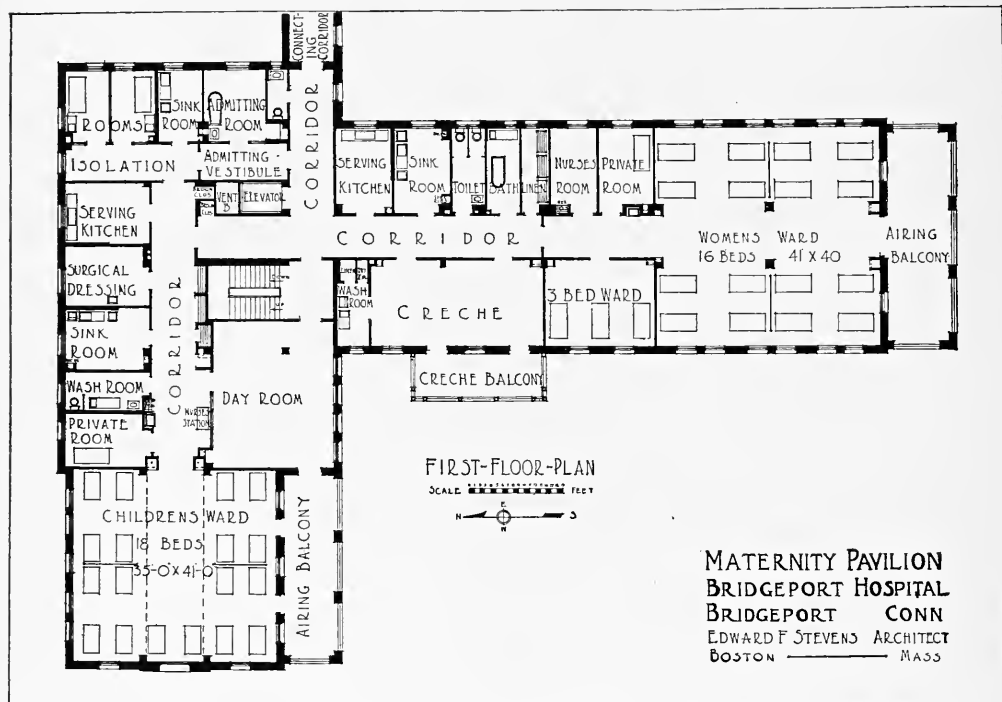


FIG. 44. PLAN OF FIRST FLOOR—MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

devoted to administration and medical treatment, and there are no patients' rooms below the second floor. The entrance lobby is large and generous, giving the would-be patient the idea of hospitality.

On the first floor (Fig. 62), besides the general office, reception rooms, etc., are located the laboratory, the hydrotherapeutic, Zander room, and X-ray room, together with rest room, toilets, etc., for the medical treatment department. On this floor is also located a

sterilizing room, anæsthetizing room, utility room, and surgeons' locker room, the surgeons' scrub-up being placed at the end of the main operating corridor. Built-in cabinets, blanket warmers, etc., make this a most complete unit.

The heating plant and laundry are in an entirely separate building.

The demand for a private ward unit in Canada's great hospital, the *Royal Victoria*, in Montreal, has been so great that one of her most generous-hearted sons has provided the means for building a

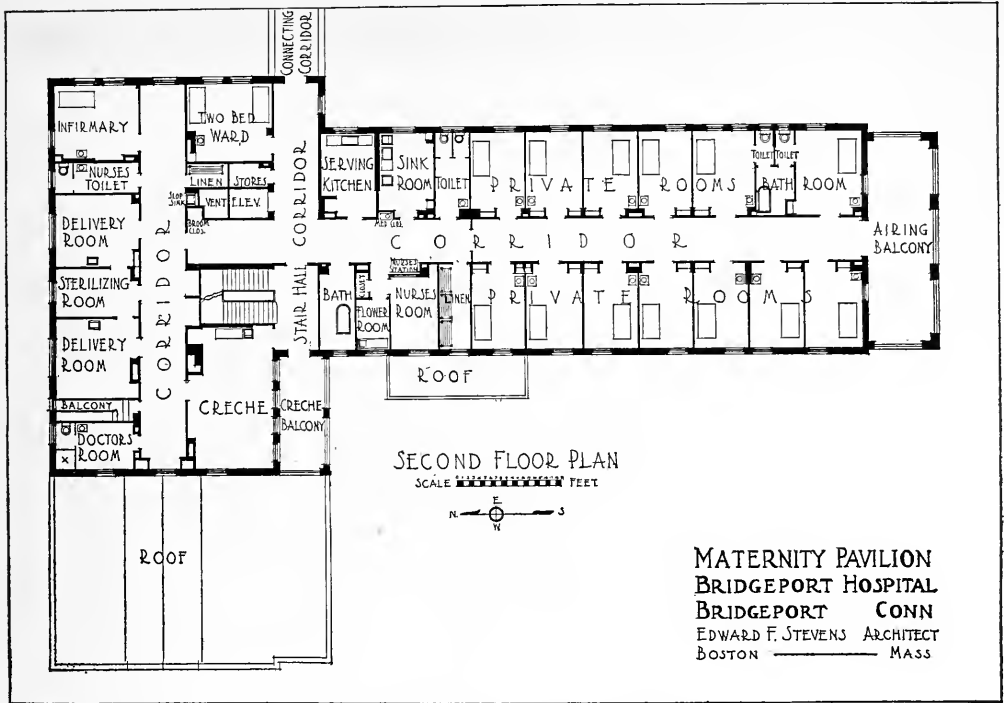


FIG. 45. PLAN OF SECOND FLOOR—MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

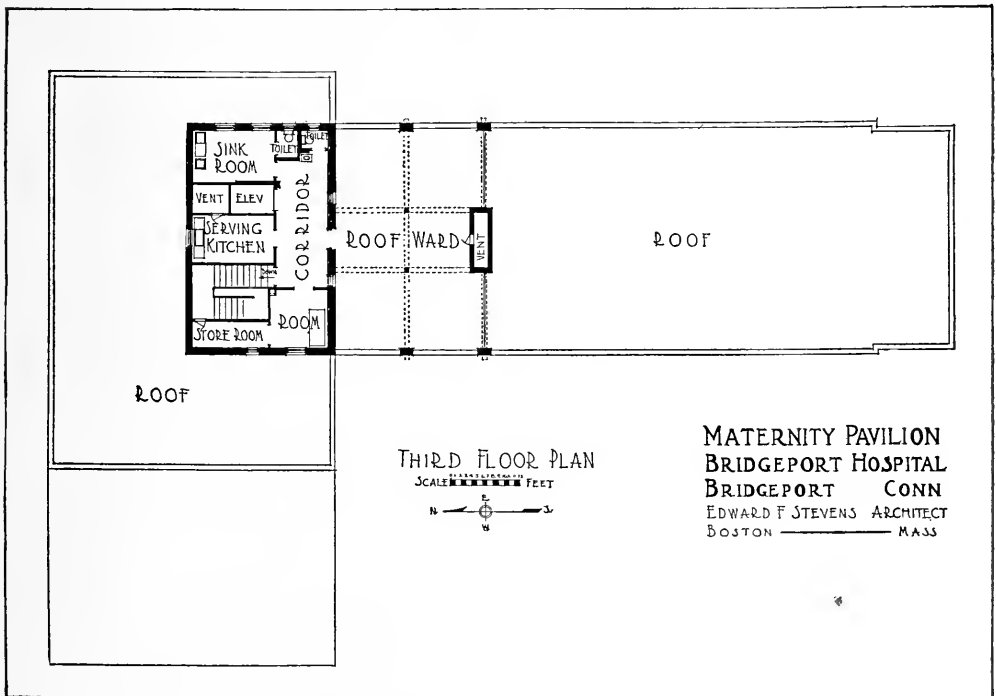


FIG. 46. ROOF WARD—MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

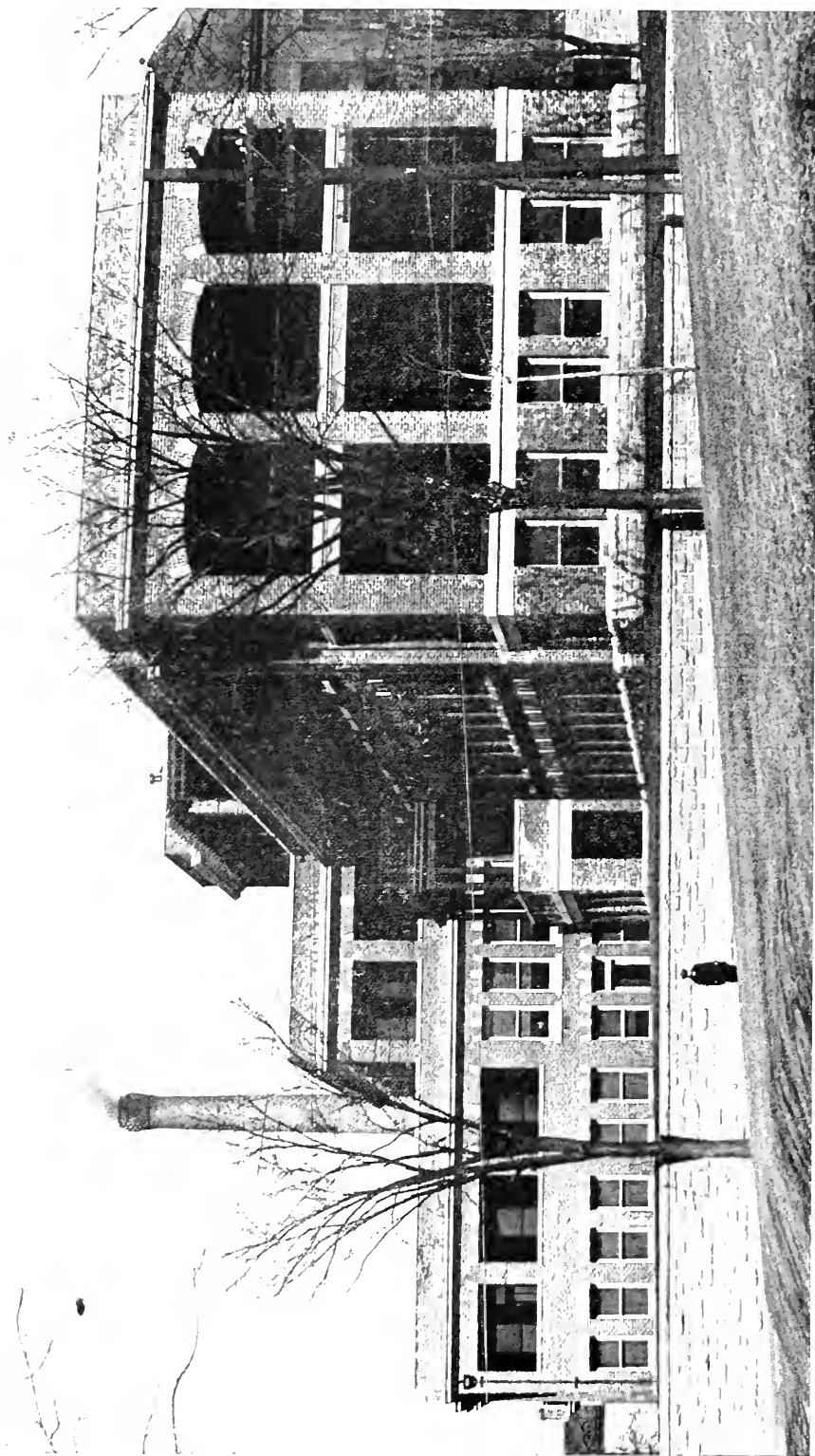


FIG. 47. EXTERIOR OF MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

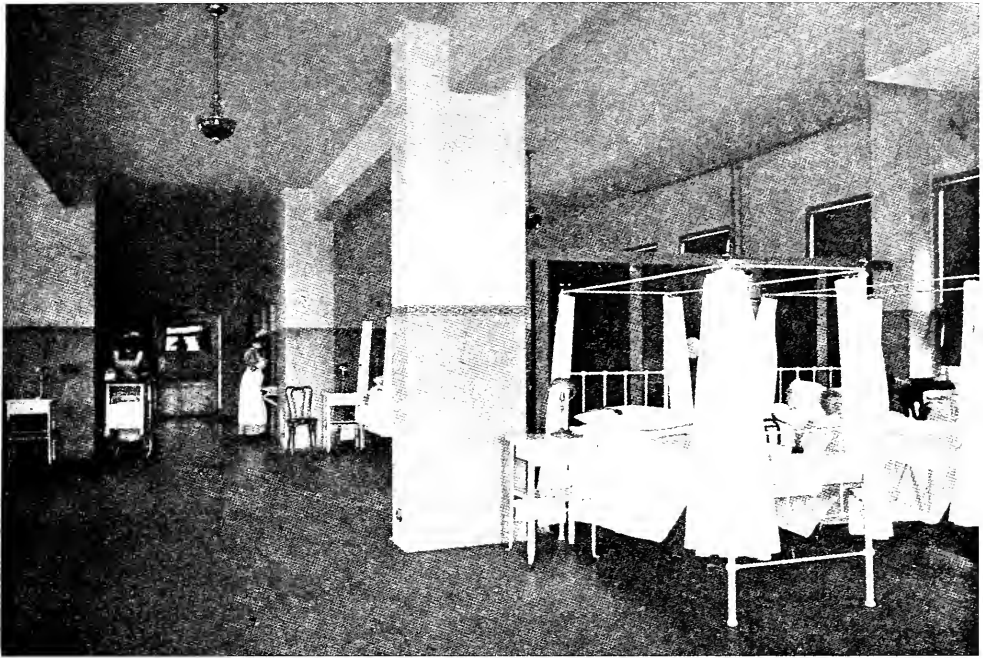


FIG. 43. MATERNITY WARD—BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

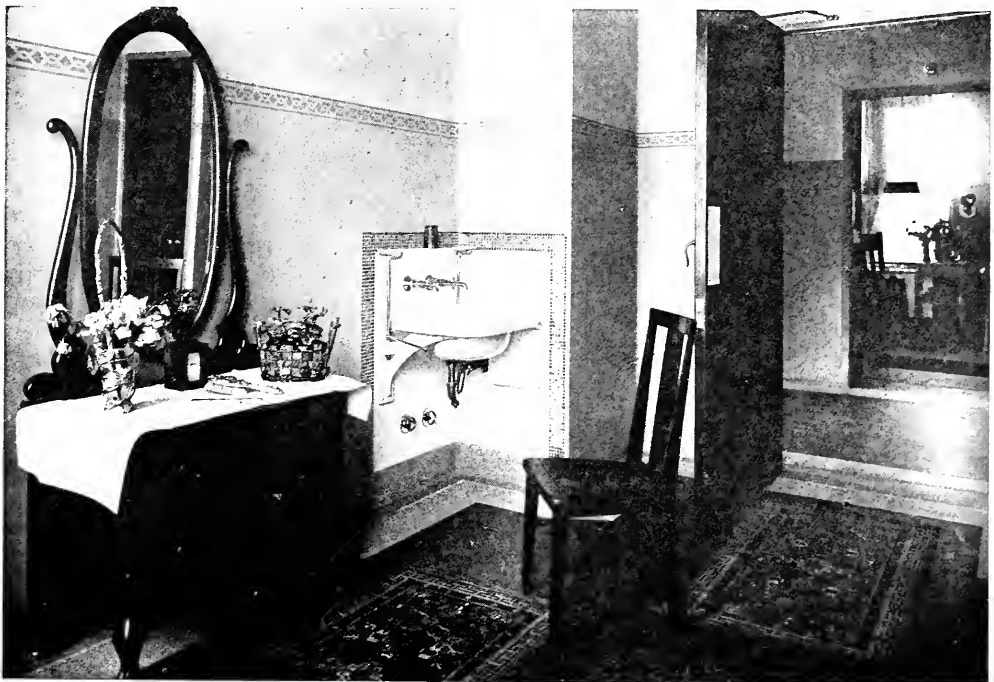
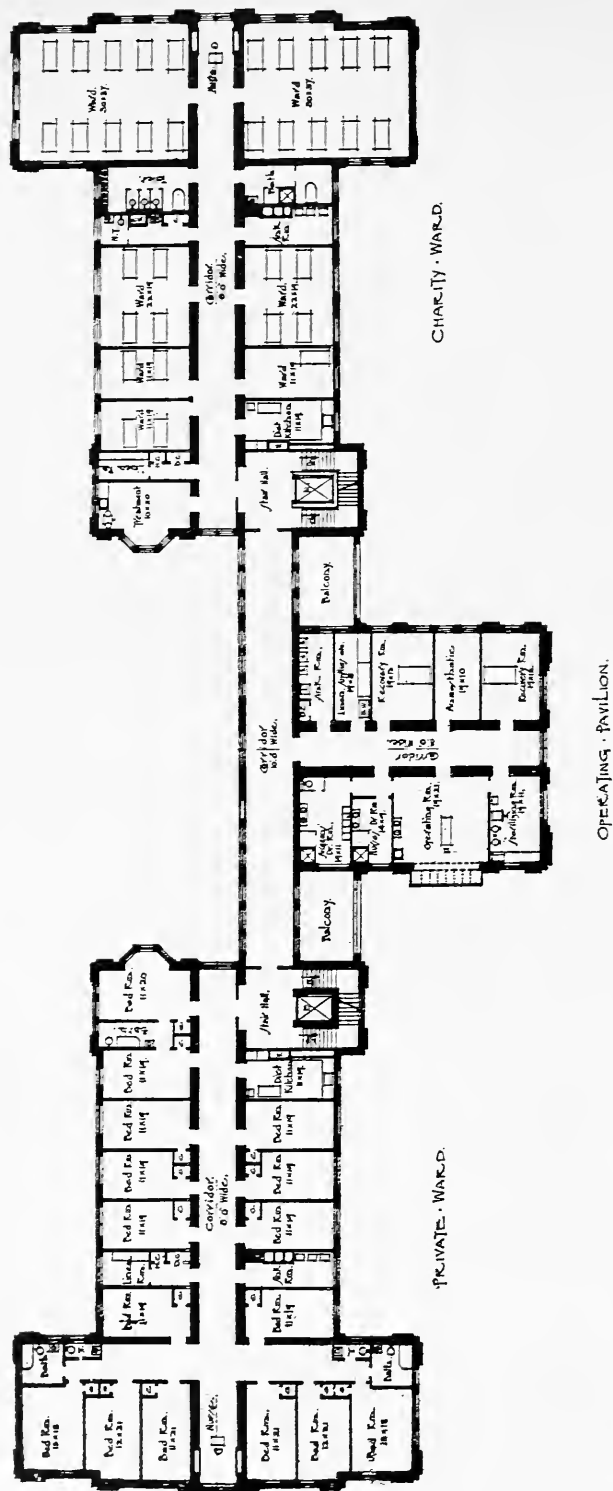


FIG. 49. PRIVATE ROOM—MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.



SECOND-FLOOR PLAN

complete and thoroughly equipped private-patient pavilion for this institution.

The general plan (Fig. 64) shows the location in connection with the existing hospital. It has been necessary to plan with precipitous grades, and the approach to this pavilion from the main hospital is over a bridge from the second story of the original building; thence through the tunnel into the mountain; thence, by means of elevators and stair-

cases, to the various floors of the new pavilion.

While every institution should have its entrance speak "Welcome" to the coming guest, it is doubly important in a building of this kind that much care be devoted to making an entrance commensurate with the object for which the building is erected. The severe hygienic detail which it is desirable to use where surgery and surgical dressings are under

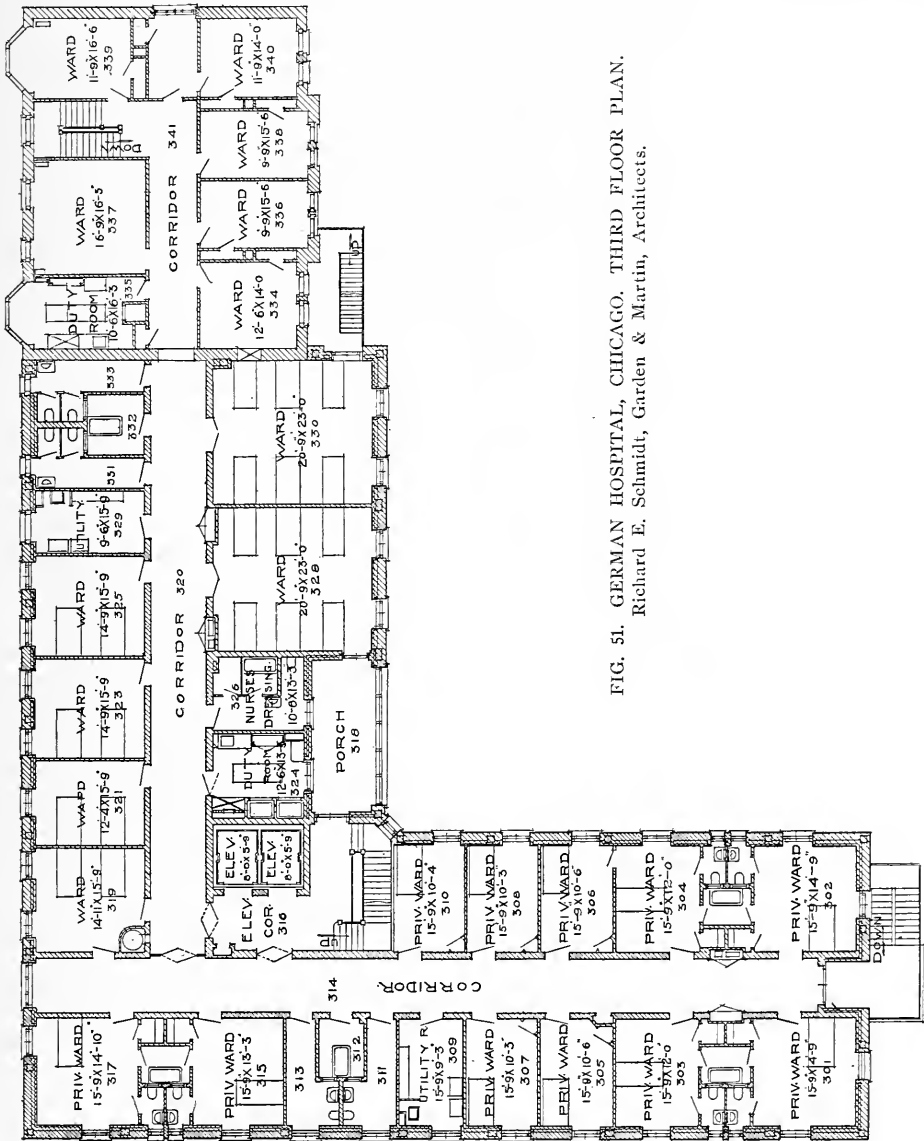


FIG. 51. GERMAN HOSPITAL, CHICAGO. THIRD FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects.

way can be abandoned here and the aesthetic side considered. While the question of hygiene should never be lost sight of in any hospital department, the hospital architect should not be a slave to this fancy, but should be able to couple good hygiene with good design.

The medical department of this building is as complete as that of any of its kind in America, for the authorities of the hospital realized that

the physician should have greater opportunities for his work than are provided in the majority of medical institutions.

The surgical department is most complete. The system of lighting is entirely indirect, no lighting fixture being in the operating room, but all concealed behind the glazed ceiling.

Entirely new models of sterilizers were designed for this building. Distilled

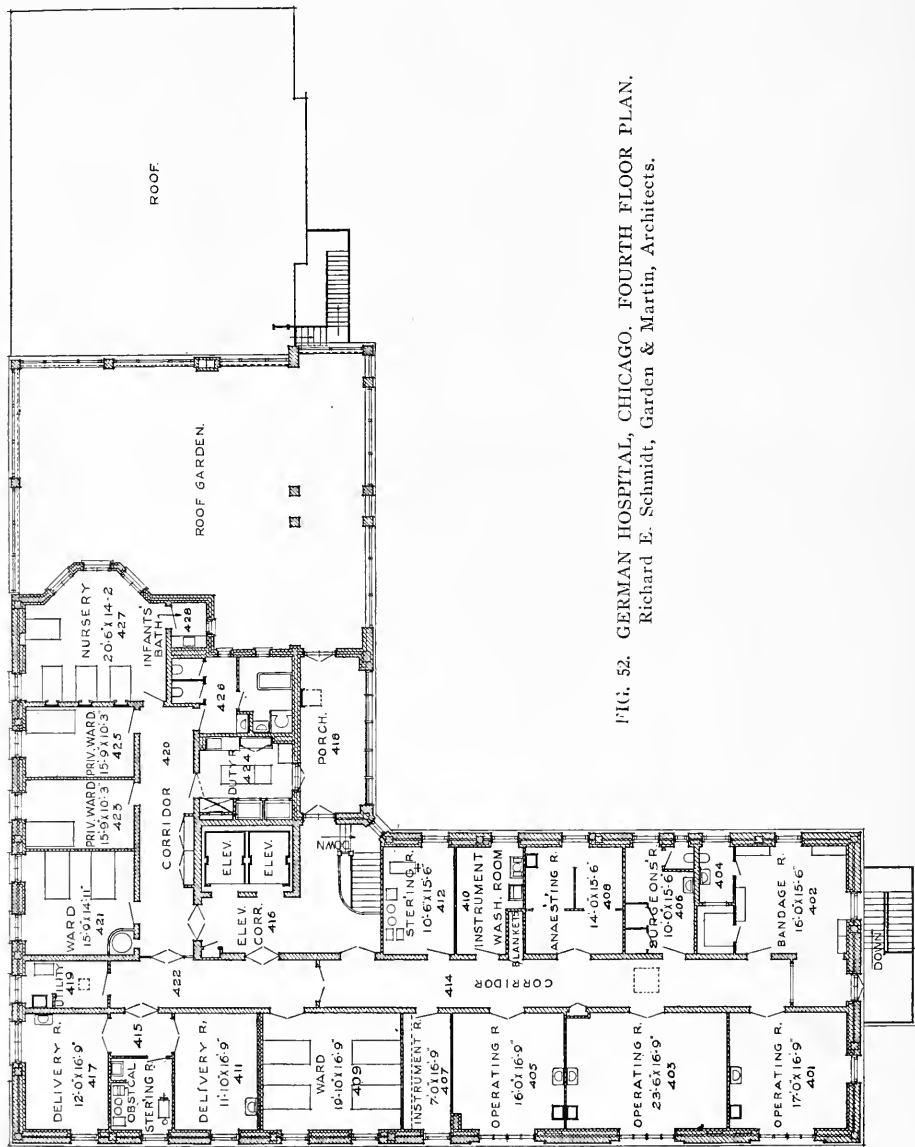


FIG. 52. GERMAN HOSPITAL, CHICAGO. FOURTH FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects.

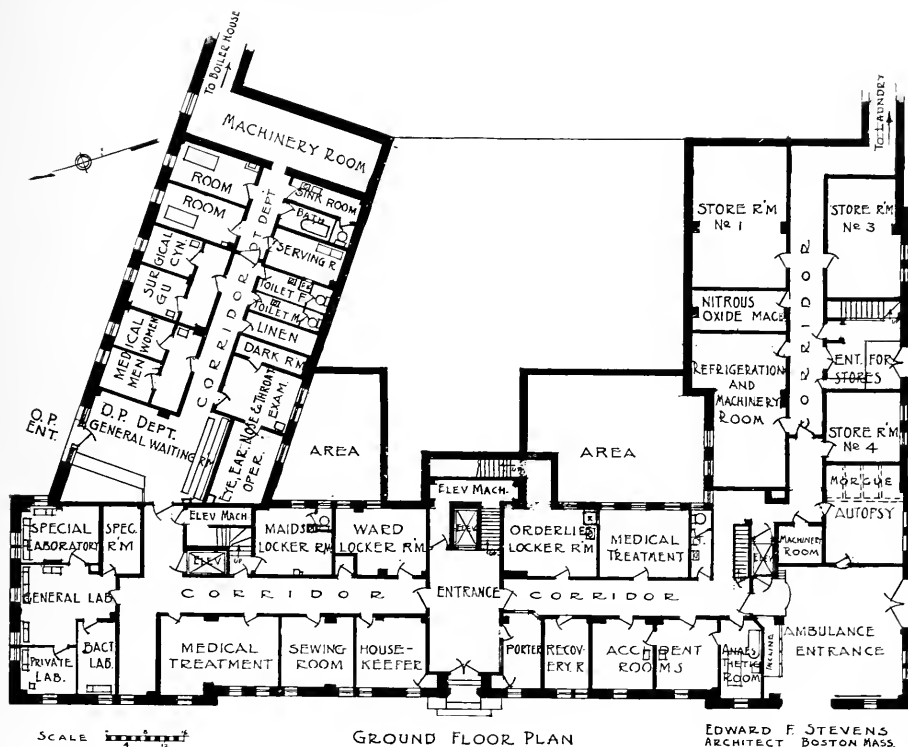


FIG. 53. OHIO VALLEY GENERAL HOSPITAL. GROUND FLOOR PLAN.

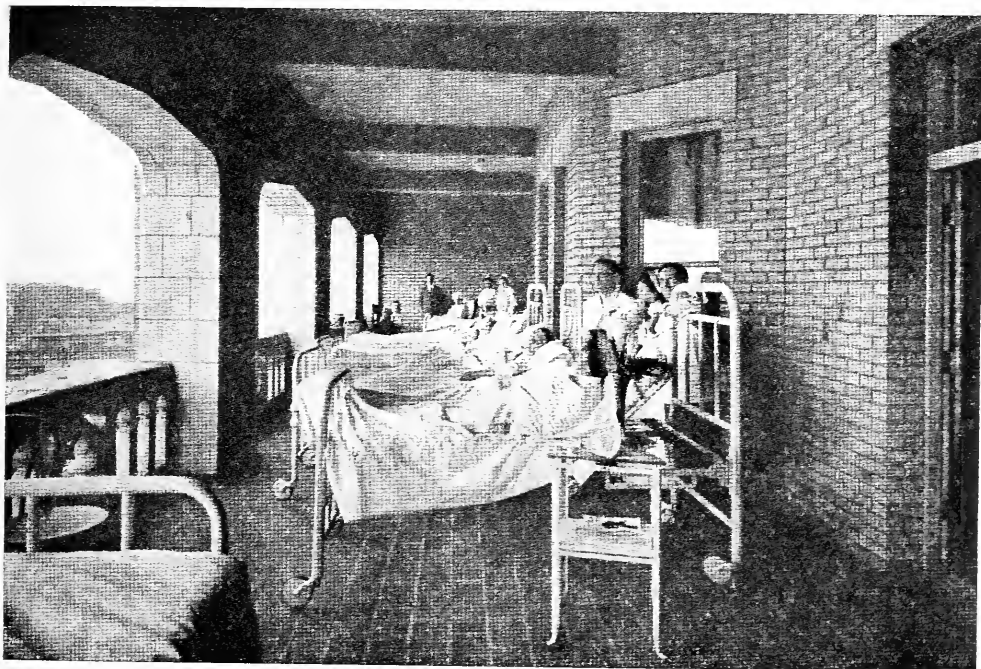
FIG. 54. AIRING BALCONY, FIRST, SECOND AND THIRD FLOORS, OHIO VALLEY GENERAL HOSPITAL WHEELING, W. VA.
Edward F. Stevens, Architect.



FIG. 54A. OHIO VALLEY GENERAL HOSPITAL. VIEW FROM REAR, SHOWING AIRING BALCONIES.

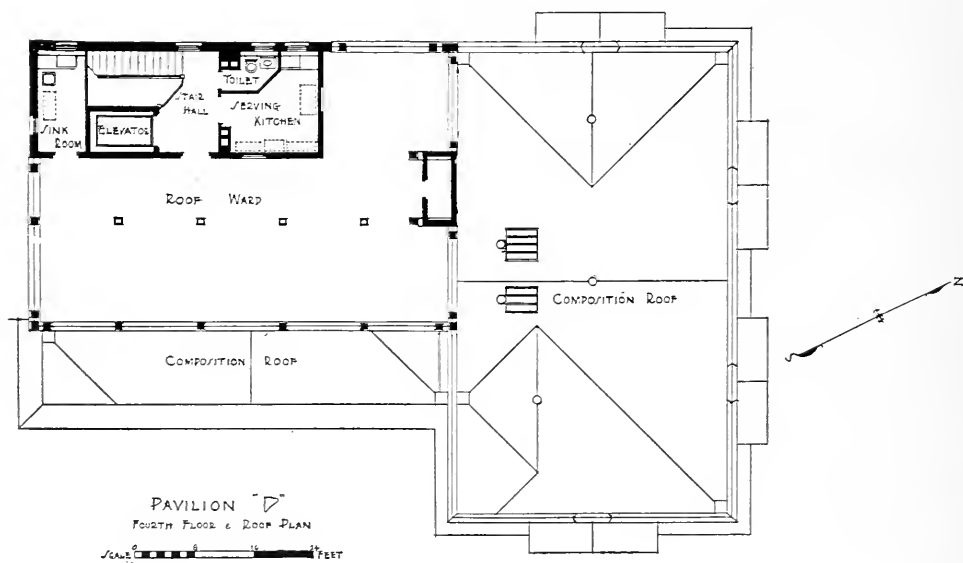


FIG. 56. MACON HOSPITAL. PRIVATE PAVILION. ROOF PLAN.

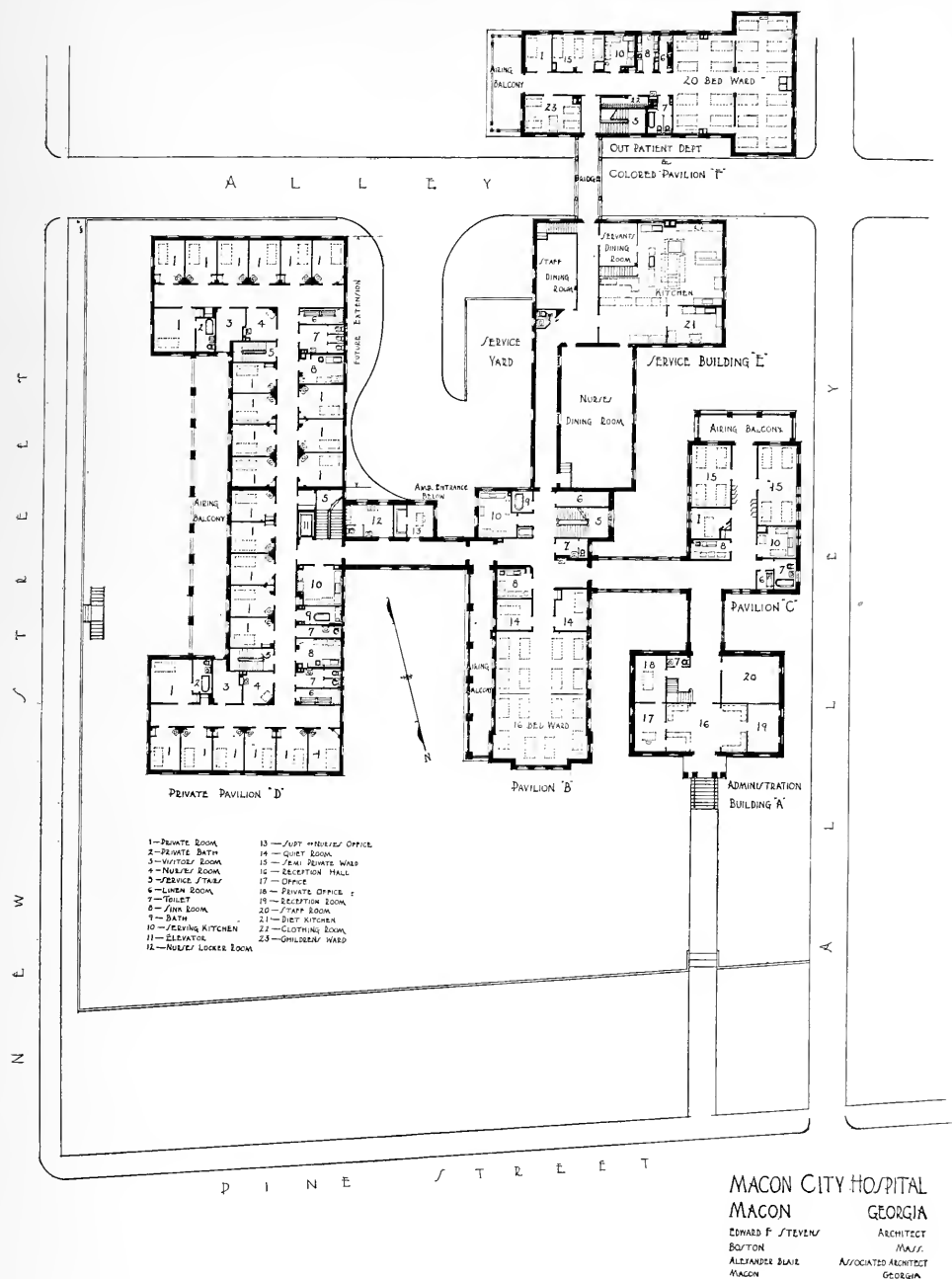


FIG. 55. FIRST FLOOR PLAN.

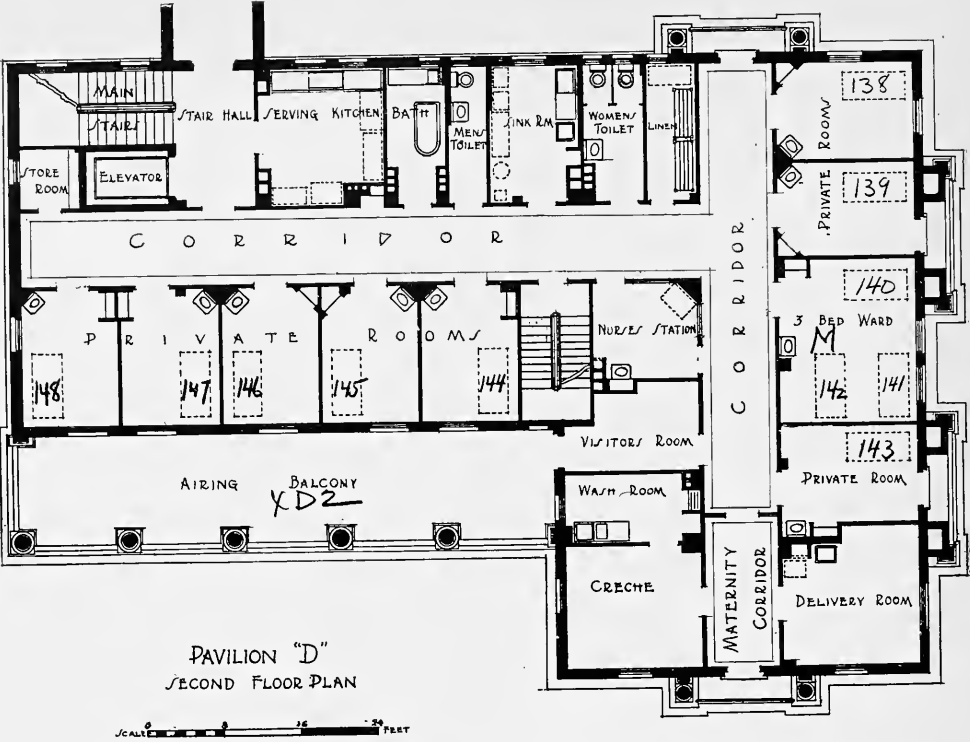


FIG. 55A. MACON HOSPITAL. PRIVATE PAVILION.

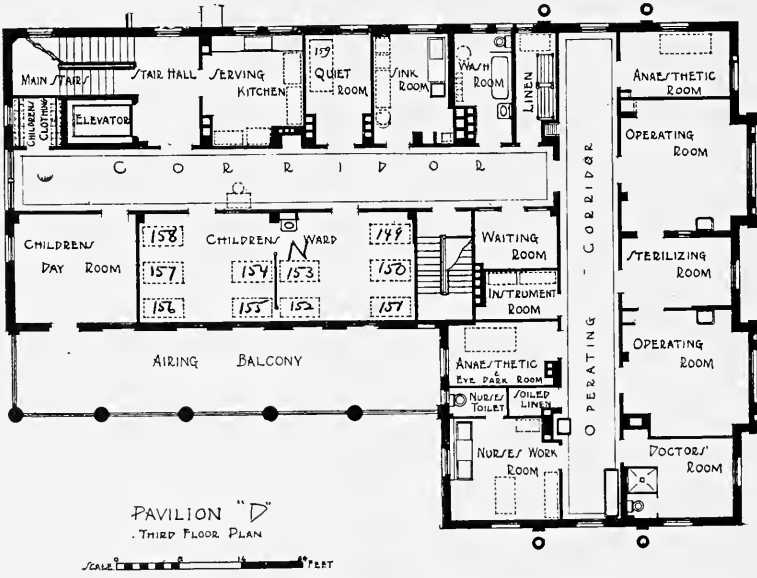


FIG. 55B. MACON HOSPITAL. PRIVATE PAVILION.

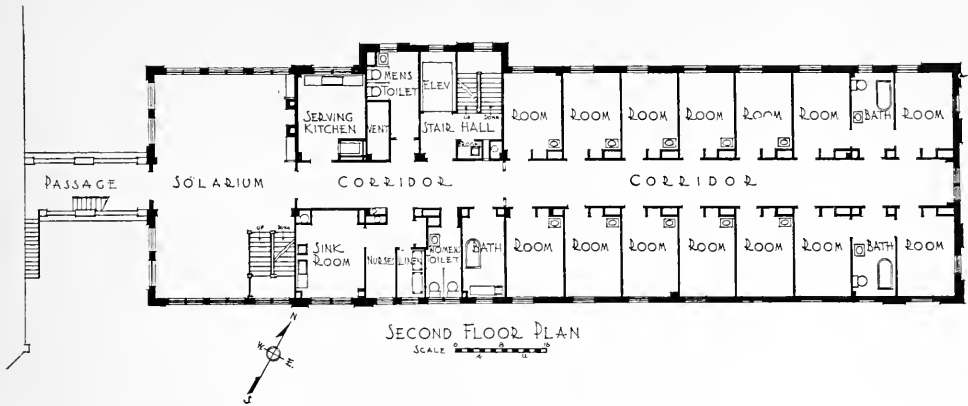


FIG. 59. HAMOT HOSPITAL, ERIE, PENN.

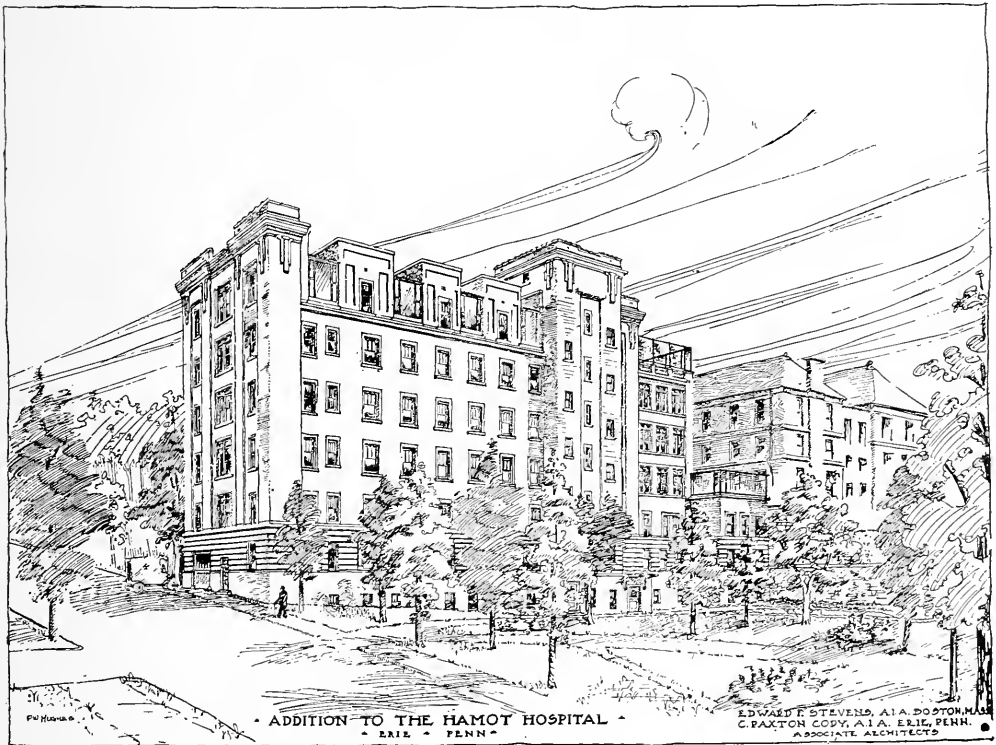


FIG. 60.

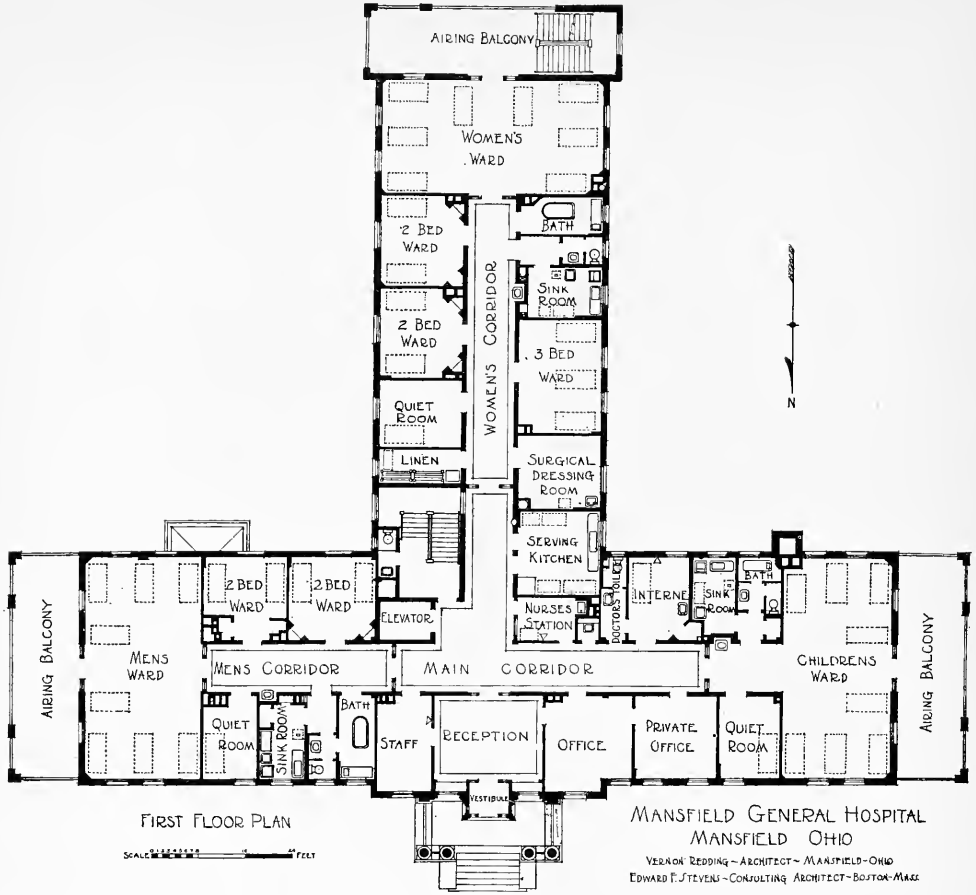


FIG. 57.

water for drinking purposes is provided on all floors.

A series of balconies from private rooms is arranged on all sides of the building, making it possible for the patients to have their own private

balconies, just as they have their own baths and toilets. Additional airing balconies for every floor are provided.

Much of the equipment for Rontgen ray department was especially designed for this building.

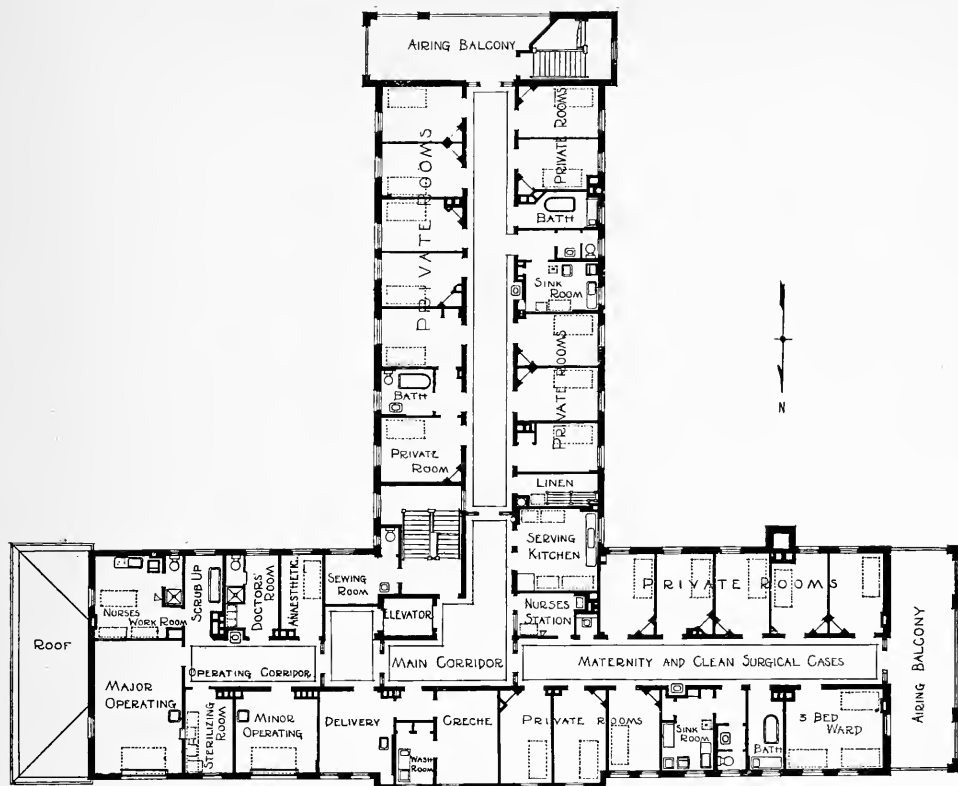


FIG. 58. MANSFIELD GENERAL HOSPITAL, MANSFIELD, O. SECOND FLOOR PLAN.

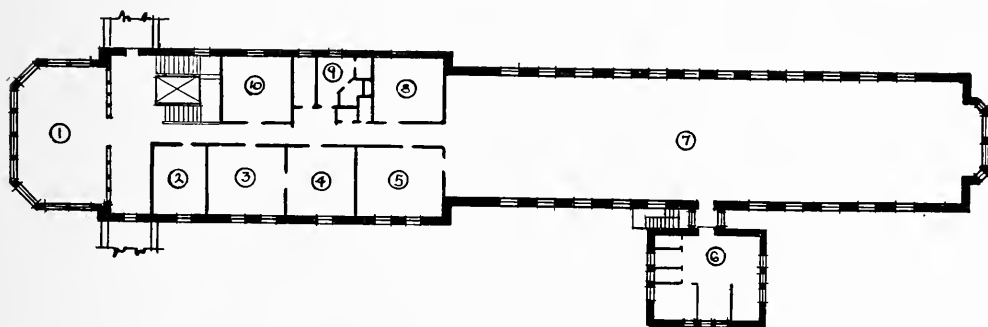


FIG. 61. SAN FRANCISCO HOSPITAL. TYPICAL WARD UNIT.

1 Solarium. 2. Laboratory. 3. Dining Room. 4. Diet Kitchen. 5 Dressing Room. 6. Toilet. 7. Ward.
8. Two-Bed Ward. 9. Toilet. 10. Two-Bed Ward.



FIG. 62. THE CENTRAL HOSPITAL. FIRST FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects, Chicago, Ill.

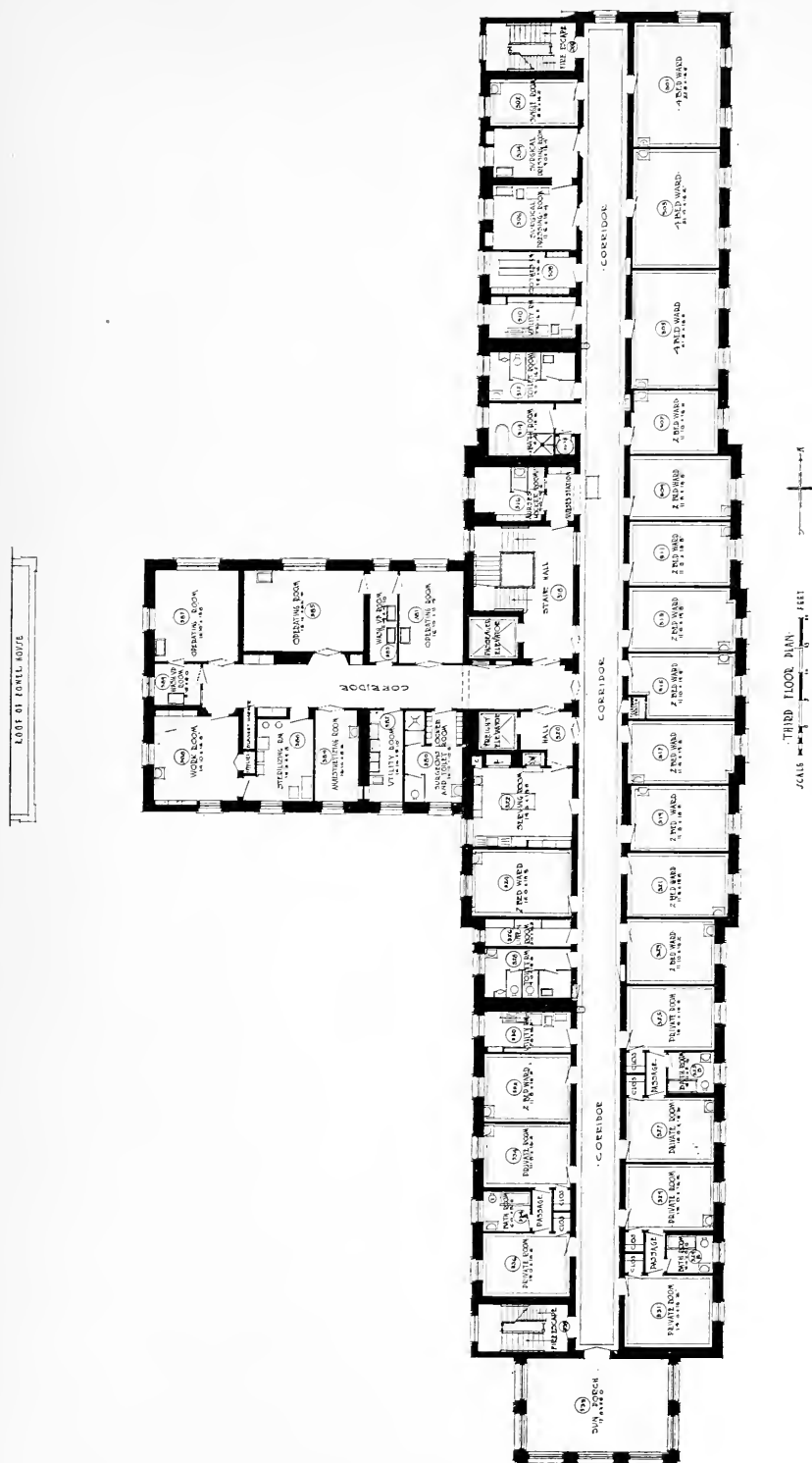


FIG. 63. THE CENTRAL HOSPITAL.
Richard E. Schmidt, Garden & Martin, Architects, Chicago, Ill.

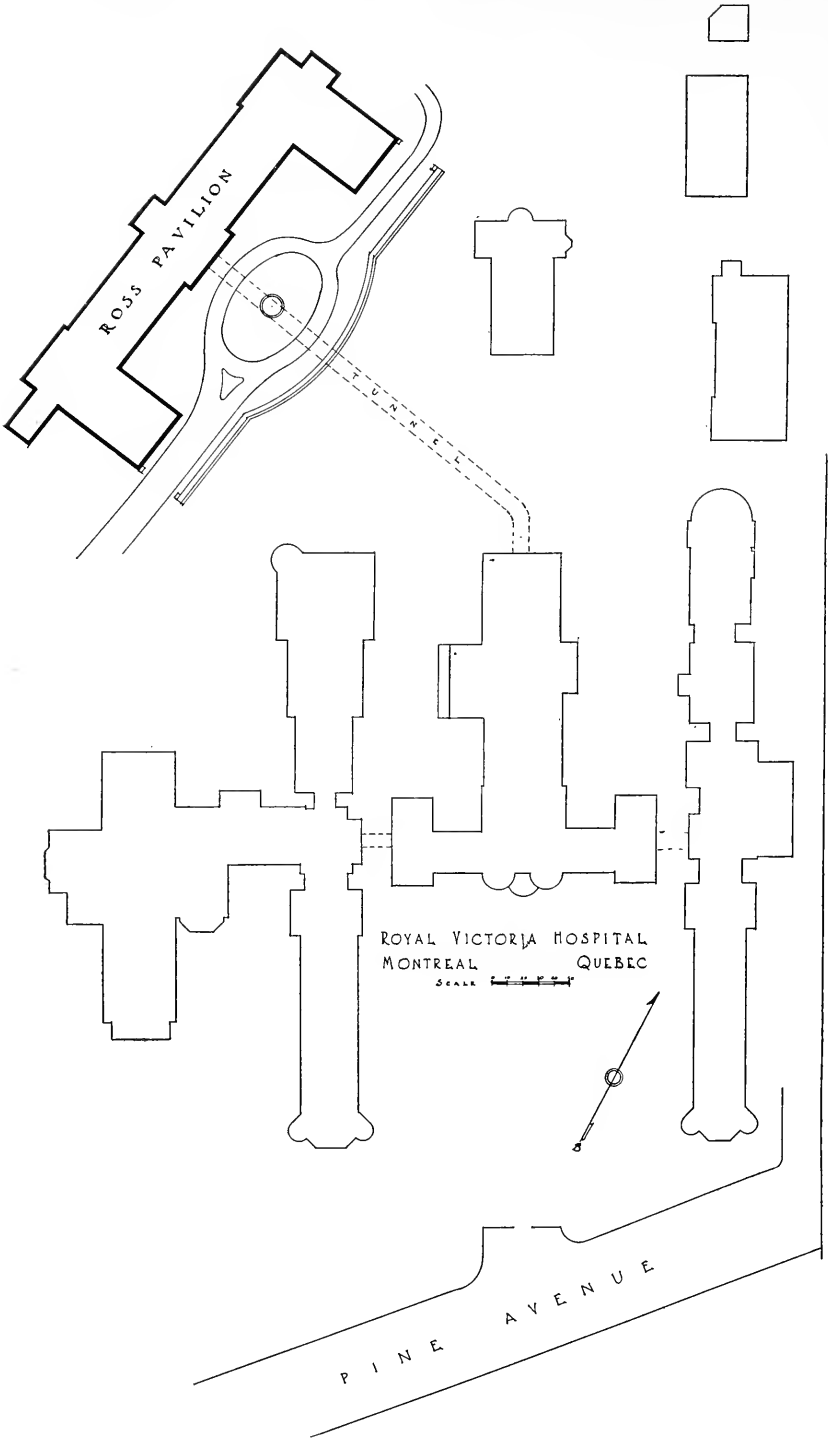


FIG. 64. GENERAL PLAN.

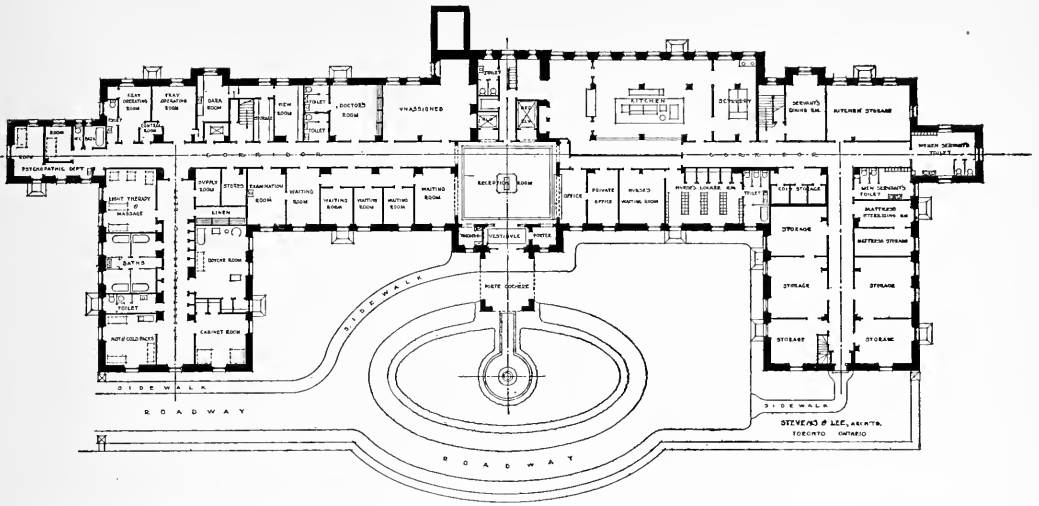


FIG. 65. GROUND FLOOR PLAN AND PLAN OF TYPICAL FLOOR—ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.
Stevens & Lee and Kenneth G. Rea, Architects.

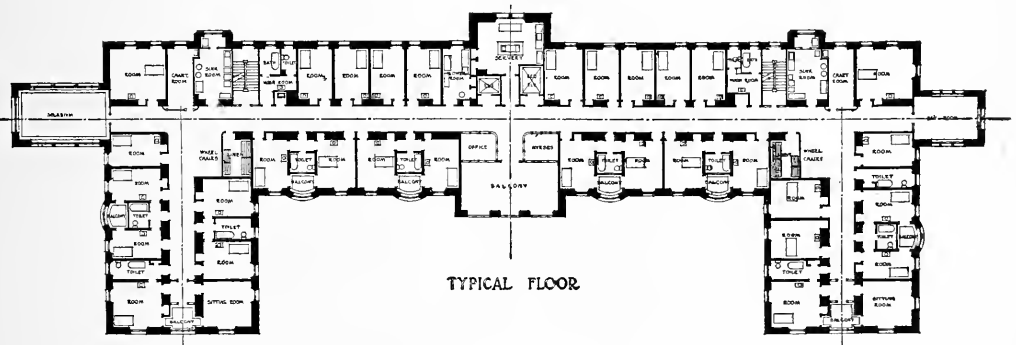


FIG. 66. TYPICAL FLOOR—ROYAL VICTORIA HOSPITAL, ROSS PAVILION.

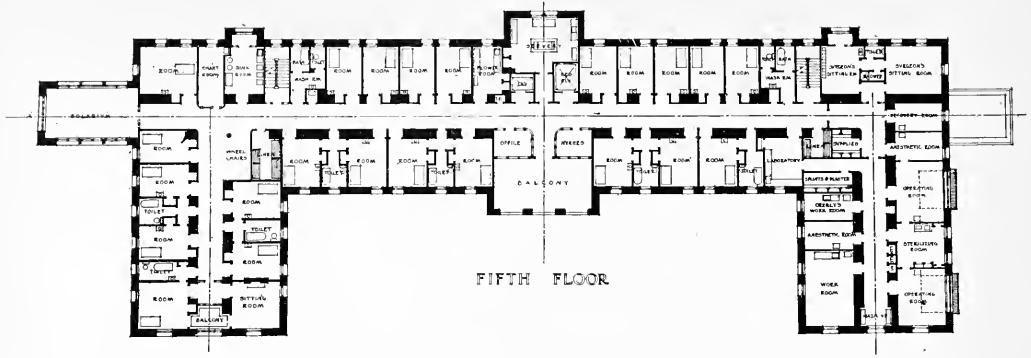
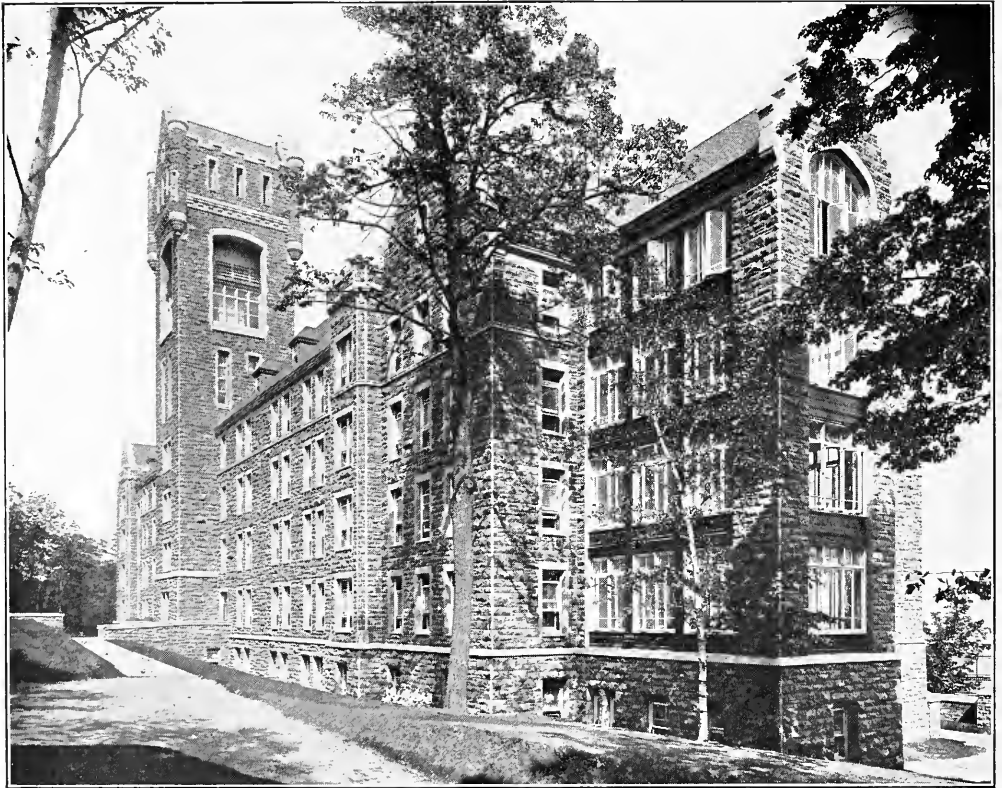


FIG. 67. ROYAL VICTORIA HOSPITAL. ROSS PAVILION.

FIG. 67B. WEST SIDE OF ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.
Stevens & Lee and Kenneth G. Rea, Architects.

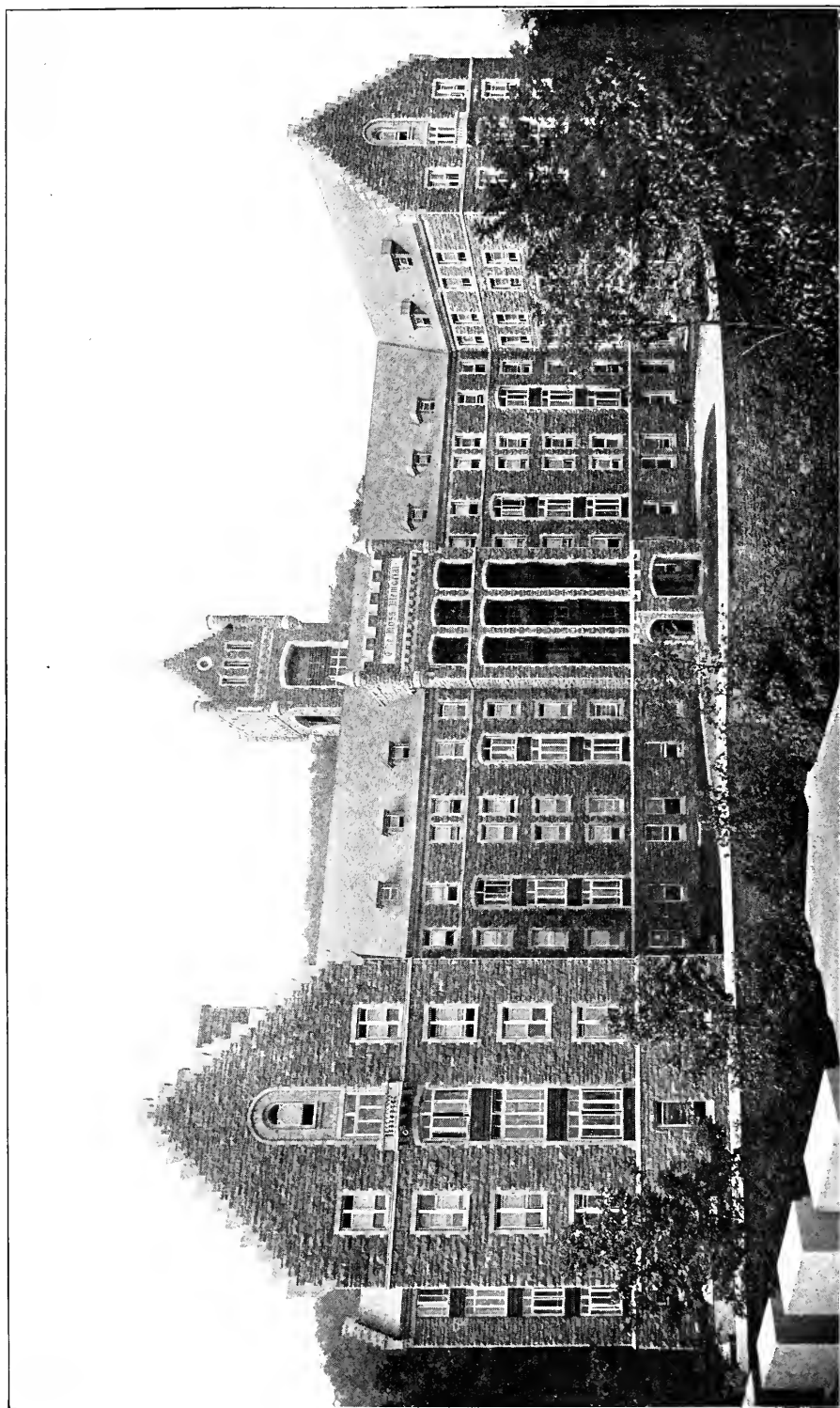


FIG. 67A. ROYAL VICTORIA HOSPITAL, ROSS PAVILION, GENERAL FRONT VIEW.
Stevens & Lee and Kenneth G. Kea, Architects.



FIG. 67D. ROSS PAVILION, ROYAL VICTORIA. ENTRANCE LOBBY.

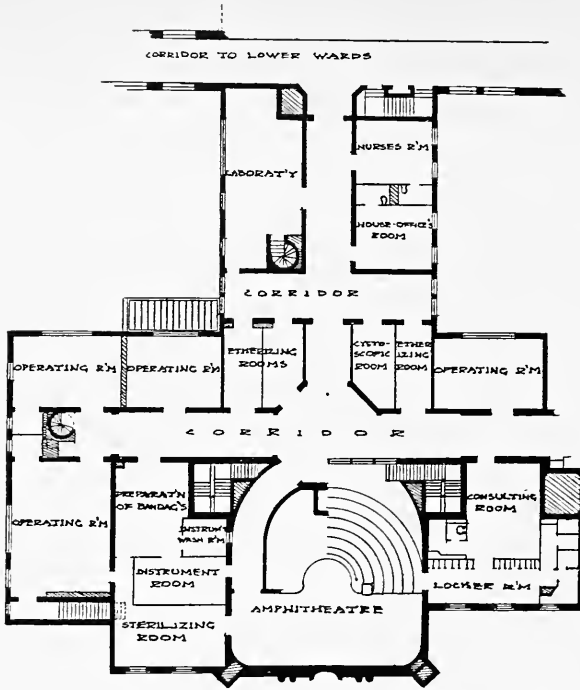


FIG. 70. MASSACHUSETTS GENERAL HOSPITAL. OPERATING DEPARTMENT.

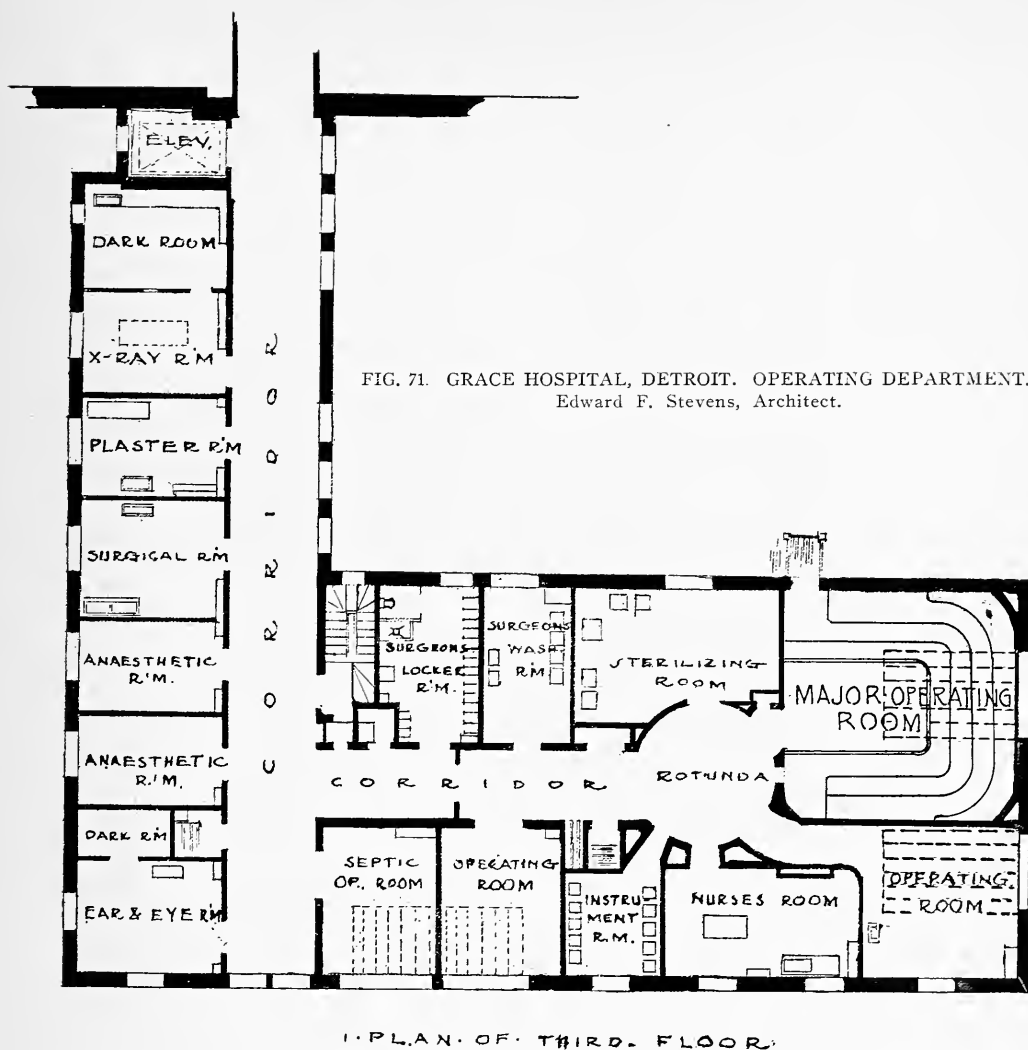
If the operating department is in a separate building, there should be an admitting room at the ambulance entrance, closely connected with the accident room which should have good north light. These rooms should not connect with anything except the corridor. This accident room can also be used for septic cases.

The day of the amphitheatre in the modern hospital, as an operating unit for teaching, seems to have gone. While the amphitheatre is used, of course, for teaching in clinics and lectures, the majority of surgeons have come to the conclusion that in order to gain an intimate knowledge of live tissue the student must be very close to the patient under operation, and smaller and more numerous classes are formed.

The *major operating room* should have no plumbing or other attached fixtures, except perhaps a flushing floor drain and a sterile water outlet. A small electric instrument sterilizer may be thought desirable, but with the sterilizing room close at hand this is not necessary.

The *heating* of the operating room should be sufficient for any desired temperature within reason. Fresh air should be introduced to make the room comfortable to work in. This can be accomplished in various ways—by the plenum system, where the air is heated and blown in by fans; by gravity, with screens to prevent air from being fouled by dust; and by direct-indirect, with proper air inlets carefully screened. There can be no objection to direct heat, provided the heating units are readily accessible for cleaning, and provided fresh air can in some way be introduced. But the rooms used for operating, sterilizing, and anesthetizing *must* be well ventilated always. (See Chapter XV, "Heating and Ventilation.")

The *lighting* of the operating room needs careful study, both for day and for night. For the day, large vertical windows and skylight, facing toward the north or as near north as possible, are best. By carrying the vertical window sufficiently high, practically the same results without skylights are ob-



tained so far as light is concerned—e. g., Macon, Cable Memorial and Williams Hospitals. The glazing, in cold climates, should be double, or with a glass screen as at the Jefferson in Philadelphia, the Bridgeport at Bridgeport, the Royal Victoria at Montreal, etc. The skylight windows may have rolling shades between the two panes of glass in case the light is too strong.

There is much to be said in regard to *artificial lighting*. The crane light has been used successfully, having the advantage of a direct and powerful light when needed and of being swung away

easily when not wanted. (See Artificial Lighting under Chapter XIV.)

Reflected light from a high power lantern outside the operating room, with fixed reflecting mirrors, has been used with much success. Trouble, however, has been experienced through the vibration of the building, which changed the adjustment.

Reflected lights from numerous fixtures, either with direct reflectors or diffused from the ceiling, have been very successful.

Daylight effect is very desirable in the operating room. There are different

lamps and combinations with occasional improvements. The best of today appears to be from high power nitrogen lamps above the ceiling diffused by intervening glass of proper quality.

One can hardly name the *best floor* for an operating room. There are many good materials, such as non-absorbent marble,

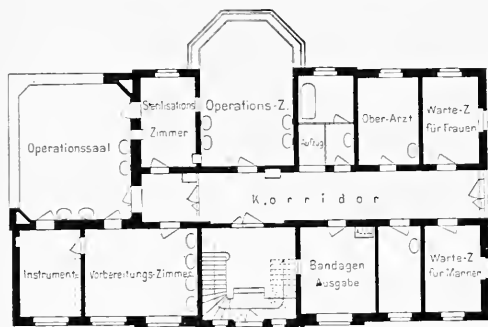


FIG. 72. ST. GEORG HOSPITAL.
OPERATING UNIT.

vitreous tile, terrazzo, and even cement if treated with a non-dusting preparation.

The *walls* of the operating room should either be lined with marble or tile, or finished in hard plaster and thoroughly enamelled. It must be possible to scrub thoroughly or spray with water or steam the entire surface of the walls and floor. To this end, a floor drain of proper construction should be supplied. (See Chapter XV, "Plumbing.")

It has been found that a clear white tile on floor and walls is too glaring in the intense light of the operating rooms; and gray, buff, and even green have been used with success. Gray Tennessee marble is very satisfactory.

Next in importance to the operating room is the *sterilizing room*. This need not be large, but should be specially ventilated; all exhaust steam pipes should be extended into the open air; and if a hood can be placed over the sterilizer, it should be done. It is advisable to place the water sterilizers or still at an elevation, so that the sterile water may flow to each operating room and, by the use of reheaters, be heated by steam or electricity. Such reheaters should be provided with elbow control valve and the

discharge nozzle protected from contact by a metal or glass hood. A proper receptacle, like a porcelain sink, properly trapped, should be placed under the reheater.

The *nurses' workroom* should be large enough for the corps of nurses needed, should be provided with tables for making up dressings, with sinks, slabs for cleaning instruments, special scrub-up bowls for the clean nurses, cabinets for sterile and unsterile dressings, etc.

The small *laboratory* for quick diagnoses is considered a necessary part of the operating suite. It should be well provided with apparatus for making rapid microscopic examinations of tissue while the patient is still on the table.

There should be a *surgeons' room* or rooms, of sufficient size, supplied with a locker for each surgeon, comfortable furniture, shower bath and toilet. The instrument room may have a locker or compartment for each surgeon's instruments. Anaesthetizing rooms, well ventilated, should be sufficiently screened from the operating corridor, yet near the operating rooms, and should have doors of ample width to admit a bed, with jambs and doors protected by metal.

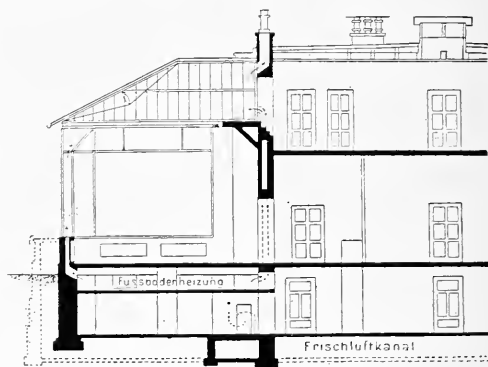
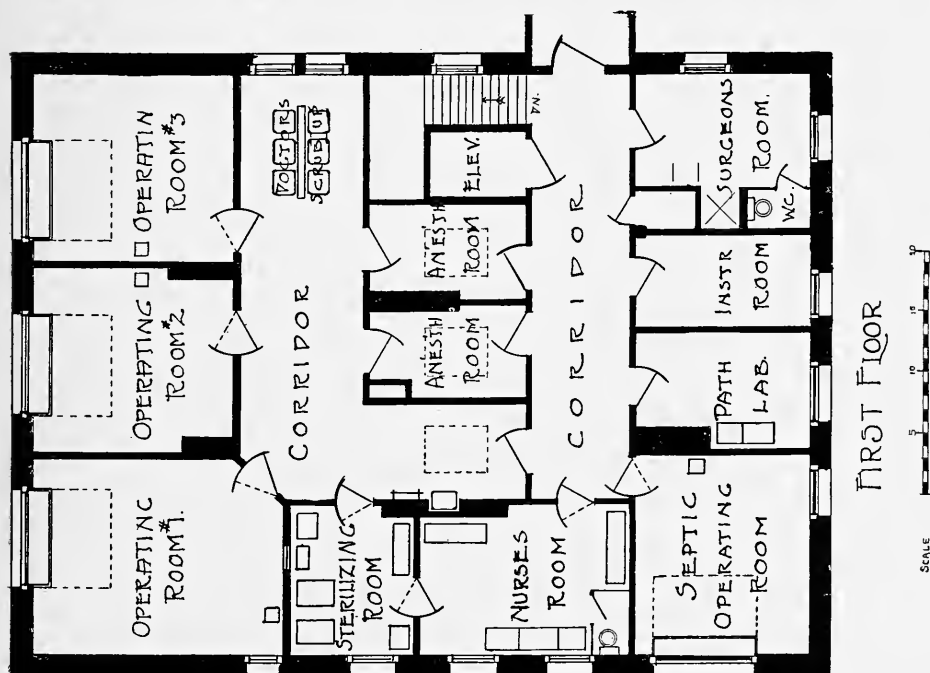


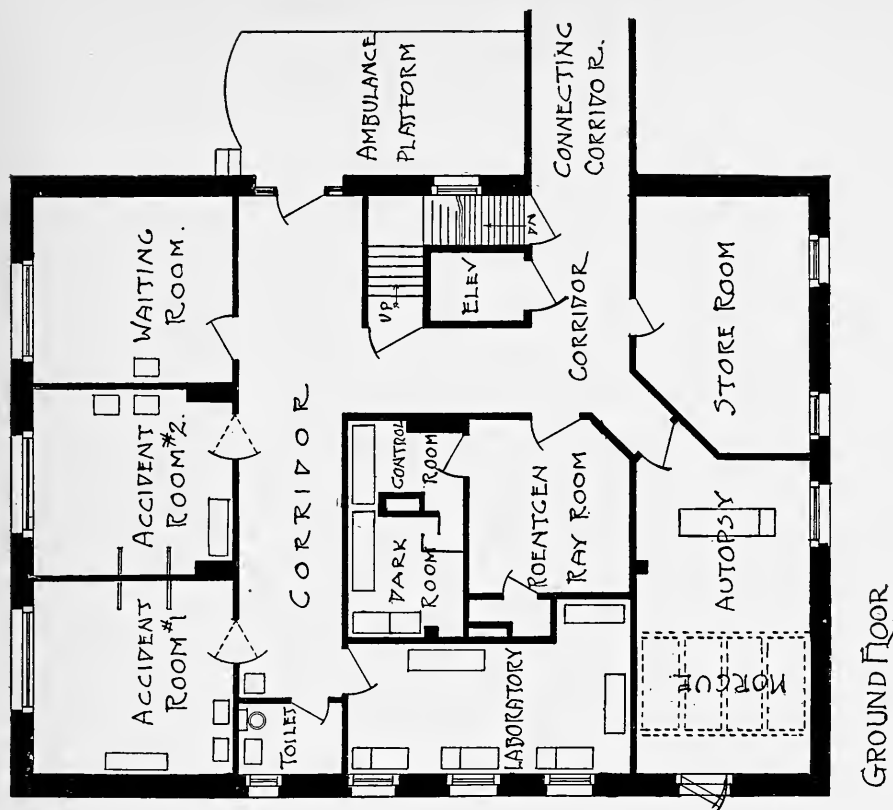
FIG. 73. ST. GEORG HOSPITAL.
OPERATING UNIT SECTION.

The scrub-up sinks should be either in the corridor or in an open alcove without doors near the operating room where there will be plenty of room for all to work without interference, and with plenty of shelf room for soap, brushes, etc.

The details of finish and equipment, the plumbing and heating of the operat-



FIRST FLOOR



GROUND FLOOR

FIG. 74. YOUNGSTOWN HOSPITAL, OPERATING DEPARTMENT.
Edward F. Stevens, Architect. Stanley & Schiebel, Associate Architects.

ing suite will be taken up in later chapters.

The operating department of the *St. Georg Hospital* (Fig. 72) at Hamburg is one of the most carefully worked out, so far as hygienic detail is concerned. Strict attention is given to the heating and ventilation (Fig. 73); the air is washed and filtered before entering the room, and the direct heating units are entirely outside the walls. The equipment is most carefully designed.

The accident department, on the ground floor, gives access for ambulance patients; the elevator reaching the first floor level. On the ground floor are the receiving and waiting rooms, the two accident rooms, laboratories, morgue and store rooms.

On the first floor are the operating rooms, with two anesthetizing rooms, which are placed in the center of the building, with skylights, and are entered either from the main corridor or from

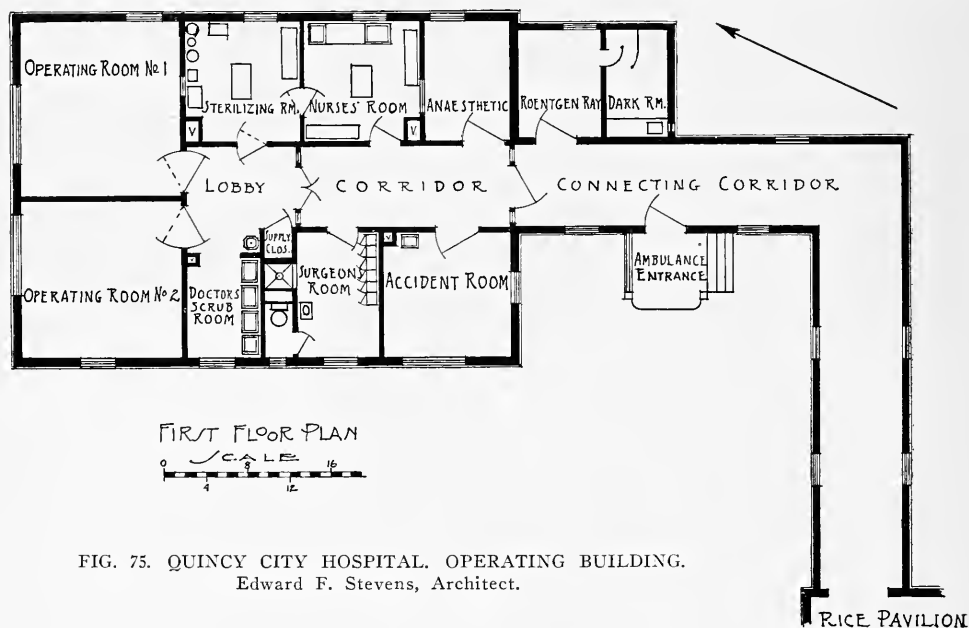


FIG. 75. QUINCY CITY HOSPITAL. OPERATING BUILDING.
Edward F. Stevens, Architect.

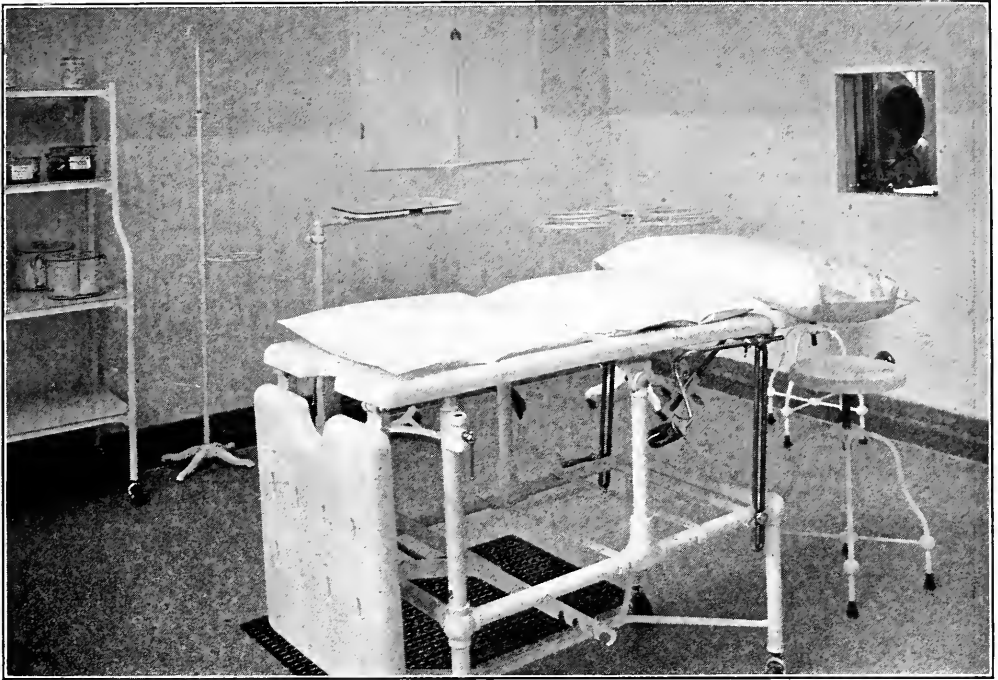
In the operating department of *Grace Hospital*, Detroit (Fig. 71), there are three rooms for clean surgery, besides the septic, surgical dressing, and plaster rooms. The surgeons' locker and dressing rooms are outside the clean portion of the department. Here the room for scrubbing up is not connected with the locker room. There is a large sterilizing room and a larger room for the nurses' work of preparation; also an instrument room where each surgeon has his own compartment in the instrument case, etc.

The operating building of the *Youngstown Hospital* (Fig. 74), Youngstown, O., is two stories in height, and is divided into two sections—the accident and the operating proper.

the operating corridor. This makes it unnecessary for the patient to enter the operating corridor until anesthetized. The three clean operating rooms open from a ten-foot corridor, in which are the surgeons' scrub-up bowls, so placed that six men may scrub at once. A septic operating room is provided, a large sterilizing room, a large work room for nurses, instrument room and a small laboratory.

Sterile water is brought from a central apparatus to each operating and accident room, and there heated locally by electricity.

The *Quincy City Hospital* (Figs. 75 and 76), Quincy, Mass., is a small institution with a capacity for fifty beds,



NO. 76. QUINCY CITY HOSPITAL. VIEW IN OPERATING ROOM, SHOWING GLASS SLIDE OVER INSTRUMENT STERILIZER.

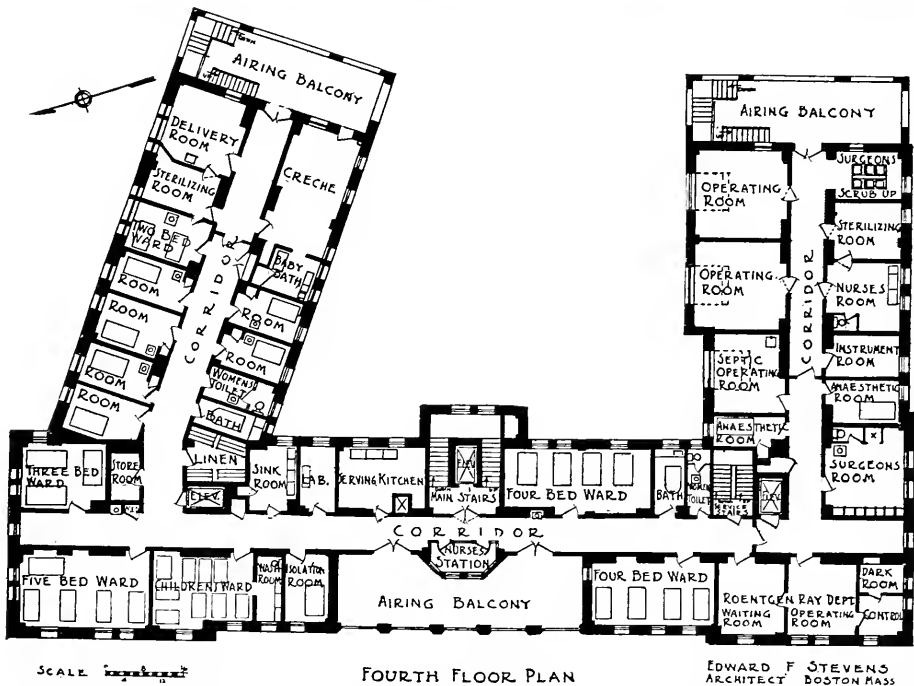


FIG. 77. PLAN OF FOURTH FLOOR, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

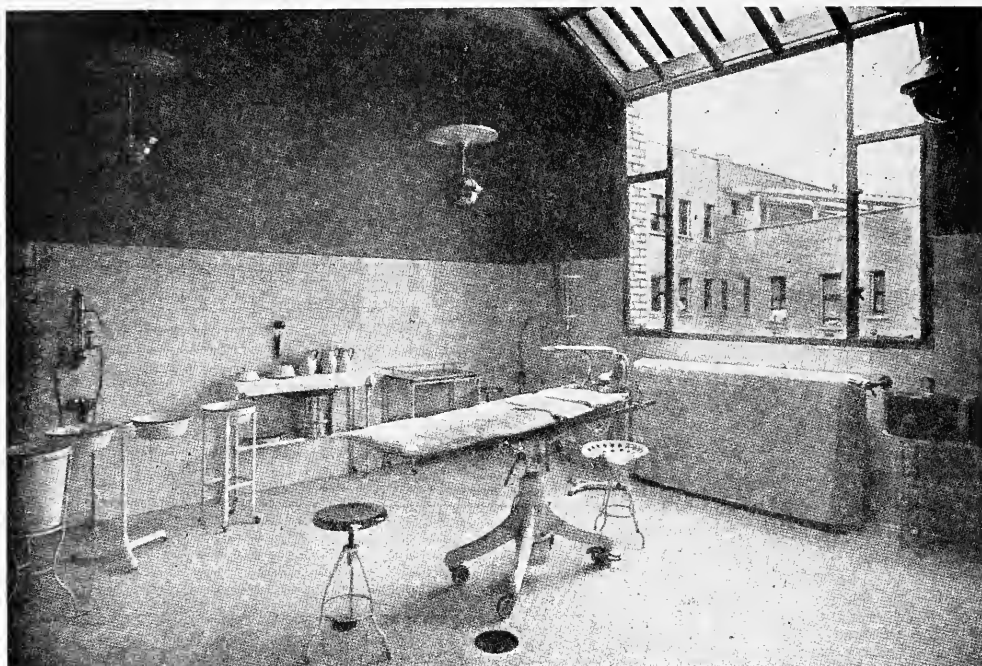
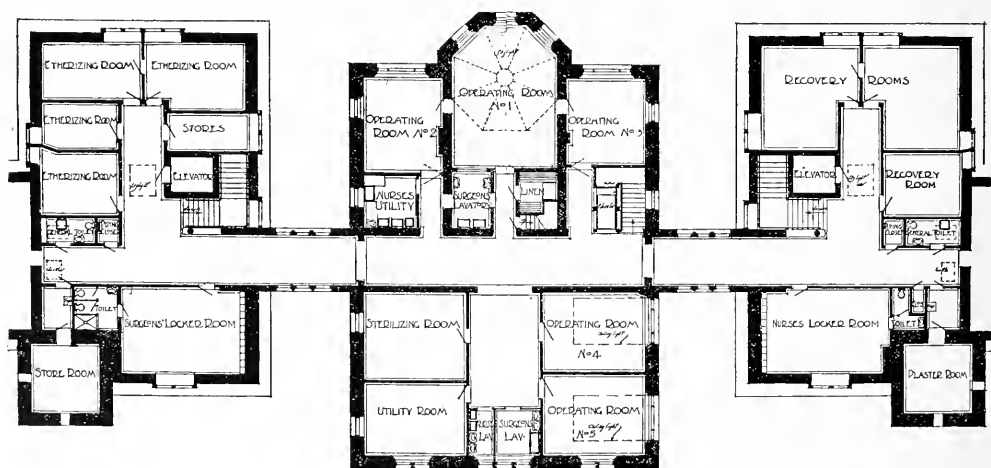


FIG. 78. OPERATING ROOM—OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.



KENDALL, TAYLOR & STEVENS
ARCHITECTS

FIG. 79. RHODE ISLAND HOSPITAL. OPERATING SECTION.

but its operating department is in a separate building. In this, all the essentials have been provided. The accident and Roentgen-ray rooms and surgeons' room are removed from the clean corridor.

At the *Ohio Valley General Hospital* (Fig. 77), one wing of the fifth floor is set apart for the operating department, with one septic and two clean operating rooms. The scrub-up basins are placed in the center of an open cross corridor, accessible from all sides. Sterilizing room, nurses' work room, surgeons' and anesthetizing rooms are placed conveniently for service. Distilled water from a supply tank in the tower furnishes sterile water for the operating, accident, maternity, and laboratory departments.

The operating pavilion of the *Cincinnati General Hospital* (Figs. 86 and 87) is most complete, each operating unit having its own anaesthetic room adjoining and recovery room close at hand. The necessary nurses' work rooms, dressing, instrument, and laboratory rooms are provided.

The lecture amphitheatre, while in the same building, is not directly connected, but is reached through the lower level and approached by two elevators and staircases.

It is quite common, in modernizing an old hospital, for the provision for the operating department to be somewhat limited; and it is not an unusual thing for the attic story, which has been used as kitchen or servants' quarters, to be turned over to the architect to make into a modern operating department. Two or three examples of this may be helpful.

In the *Rhode Island General Hospital* (Fig. 79) at Providence, an unused upper story was utilized, providing five good operating rooms, and all the conveniences of a modern surgical unit.

In the *New York City Hospital* (Fig. 80), *Blackwell's Island*, the dome of the old building, formerly used as a kitchen, was so reconstructed as to meet the needs of the surgeons. The structure of the roof trusses made the planning more difficult, and the spaces which

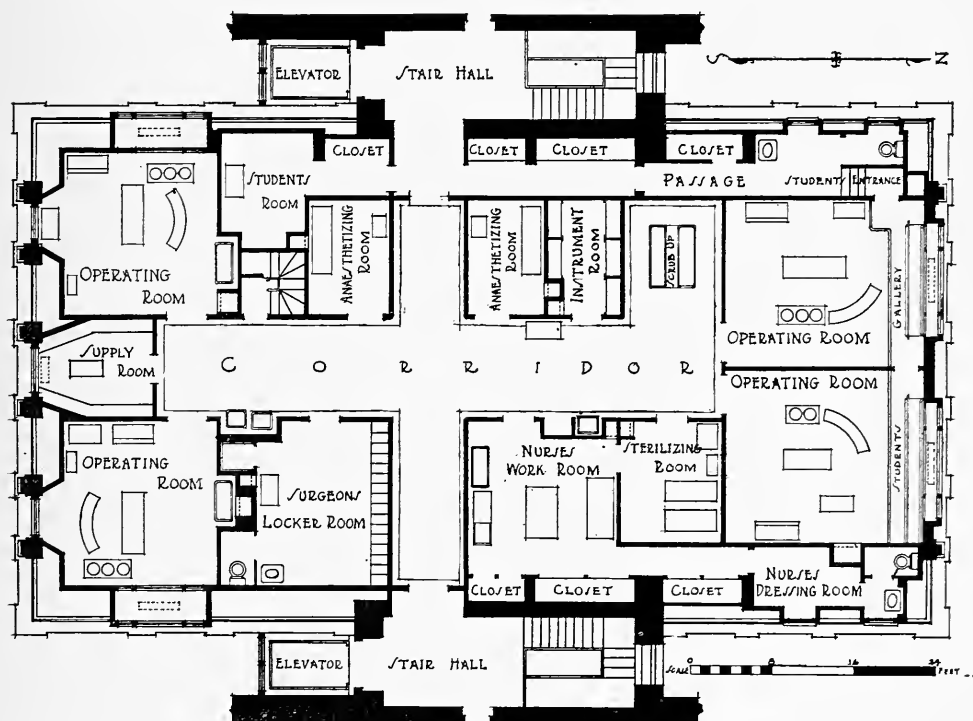


FIG. 80. NEW YORK CITY HOSPITAL, BLACKWELL'S ISLAND.
Charles B. Meyers, New York, and Edward F. Stevens, Boston, Architects.

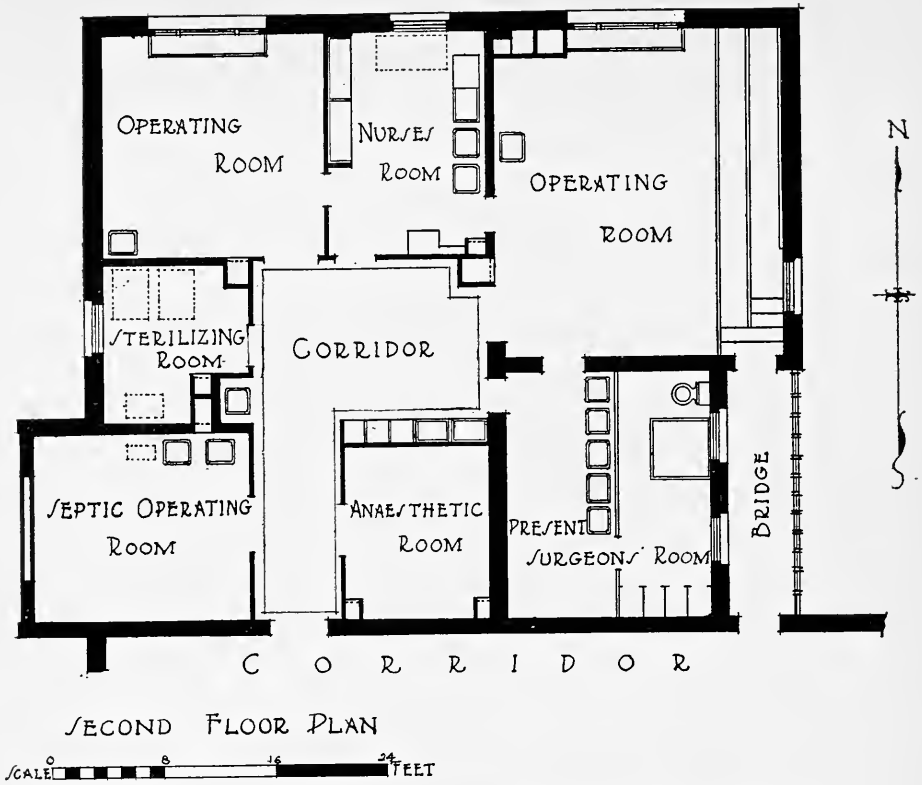


FIG. 81. BRIDGEPORT HOSPITAL. OPERATING DEPARTMENT.
Edward F. Stevens, Architect.

would in an ordinary case be used as operating rooms were very conveniently turned into nurses' and students' locker rooms, and entrance to students' gallery (in no sense an amphitheatre). Sky-lighting of all rooms was practically necessary. Four operating rooms are provided, only two of which could have the north exposure. Here again distilled water is made at an elevation, and conducted to the various rooms.

At the *Bridgeport Hospital* (Figs. 81

and 82) the case was slightly different. An old operating theatre, with a small addition, was turned into three modern operating rooms, with sterilizing, instrument and work rooms. Entrance for students to the major operating room was secured by a gallery from the main corridor.

Built-in cabinets (Fig. 83), distilled water reheaters, and specially designed equipment make this a very complete department.

CHAPTER V.

The Medical Unit

The fact is recognized more and more every year that many diseases and ailments which have hitherto been considered surgical cases or which have been neglected altogether can be treated without surgery and with little medicine. The medical treatment or bath department, as it is called in European countries, is gradually being introduced into the general hospital plan. Today a careful stu-

The hospital boards in this country have given little thought to this department, but in the larger European hospitals one will find the medical units with such sections as

Mechano-therapy.
Hot air baths.
Warm air baths.
Steam baths.
Light baths.



FIG. 83. BRIDGEPORT HOSPITAL. OPERATING SECTION SHOWING BUILT-IN CASES.

dent of hospital architecture will not dare to plan for a complete layout without providing facilities for some medical treatment, if it is nothing more than a few electric-light bakers. We should not give to the surgeon and the obstetrician all the best rooms of our hospitals, but should provide space for the present and for the future for internal medicine and therapeutics.

Electric baths.
Gas baths.
Radium baths.
Sand baths.
Sulphur baths.
Mud or peat baths.
Sun baths.
Inhaling and pneumatic chambers.
Roentgen-ray, with all its ramifications.

To the student of hospital architecture the question naturally arises: If these



FIG. 82. MAJOR OPERATING ROOM—BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

methods of treatment are essential for the well-being of the poor and indigent across the sea, why should we not practice them, or some of them at least, in our institutions?

The hydro-electric bath, the carbon dioxide bath, the plunge, and those previously mentioned, are but a few of the examples one will find in the general public hospitals of Europe. Reference is not made to the various sanatoriums one finds over all the world, but to the general hospitals for the care of the poor and indigent. Should we not, in America, provide such equipment that the patient suffering from arthritis, chronic rheumatism, or cellulitis, let us say, may have the proper mechanical, electrical, heat and massage treatment, or the water-bed for severe bodily burns or sores?

It is not necessary to have a five-thousand dollar, complete hydro-therapeutic outfit; but room can be secured in every hospital for a small equipment—an electric baker, massage table, small vapor bath, etc.—and many simple home-made

devices can be brought into use, if the medical student of today will only prepare himself to use them when he comes to be on the hospital staff of the future.

Heat is an important therapeutic agent, whether it is applied by warm air, steam, electric light, or natural sunlight; scientifically applied, it is a recognized medium for benefiting man's ills.

If heat applied by the direct rays of an arc light has a higher therapeutic value than when applied by any other method, then this should be recognized and the equipment supplied. If the hot air bath will relieve pain when nothing else will, then this should be recognized. As the study of non-surgical methods for relieving suffering advances, hospitals should be prepared to provide the proper treatment.

The airing balcony provides sunlight for the medical as well as for the surgical patient. The simplest, and many times the most potent agency, *Sunlight*, can easily be provided in every institution.

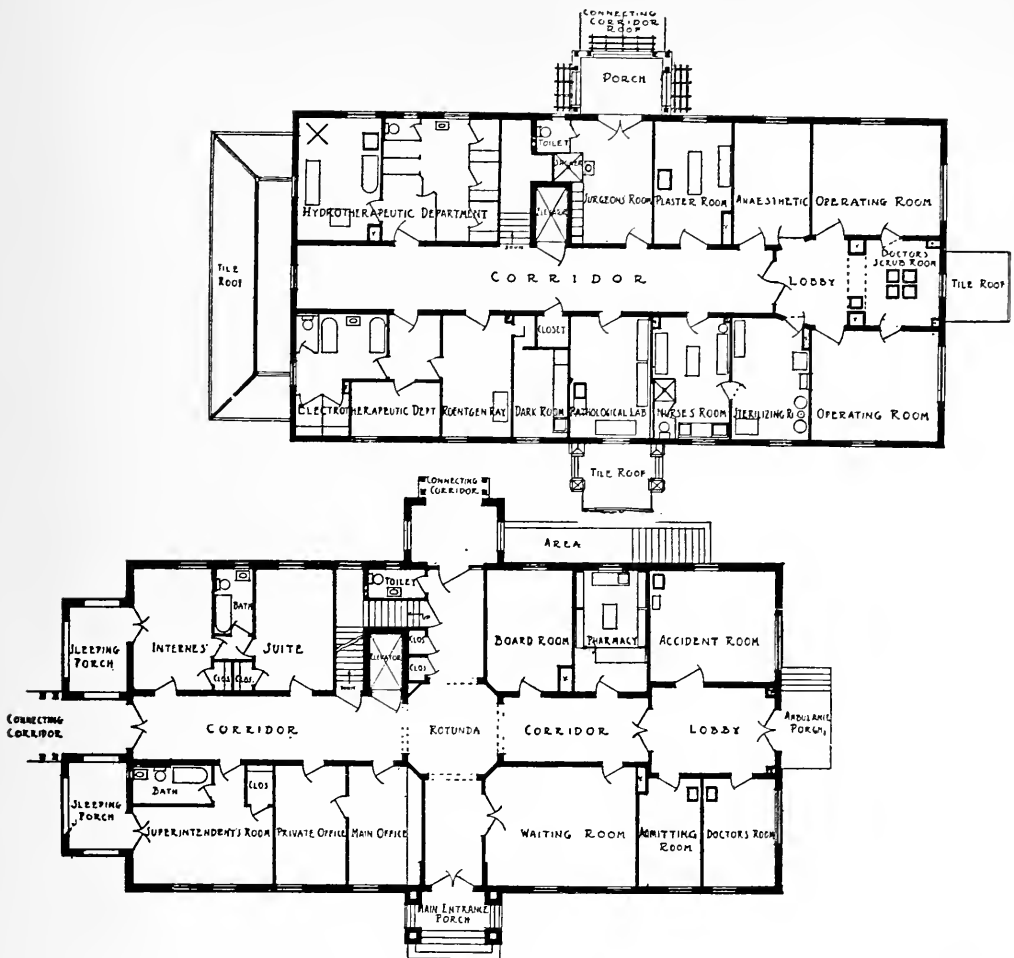
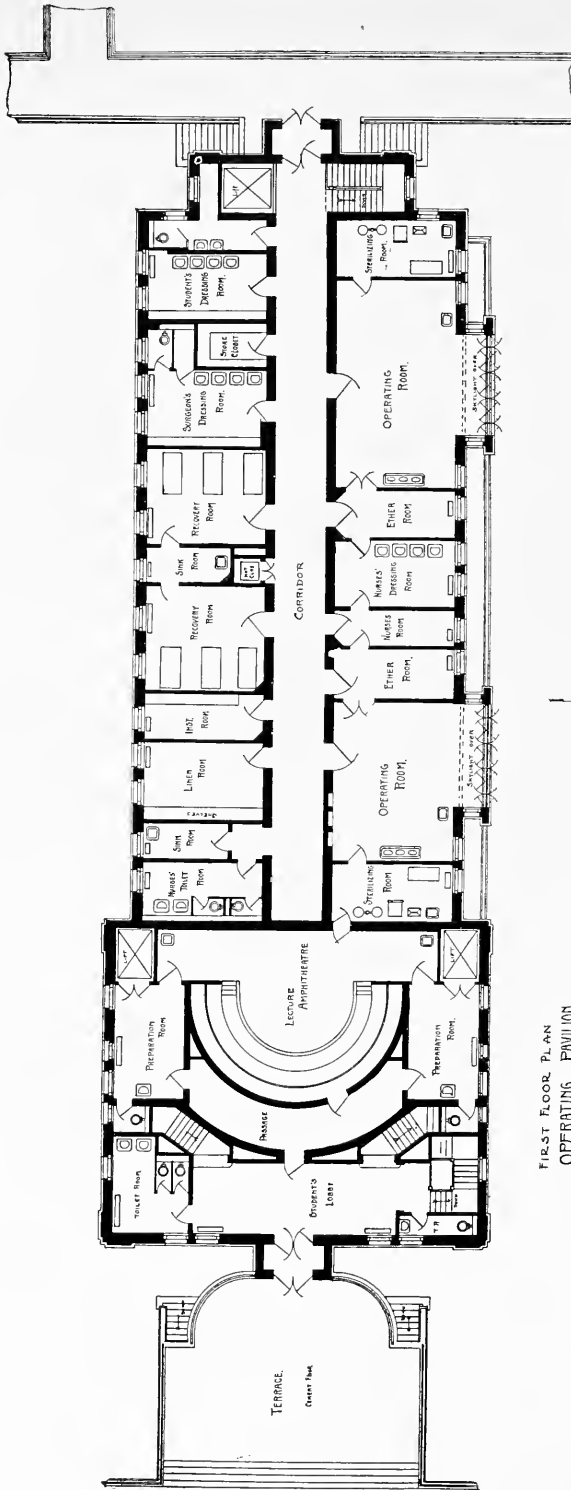


FIG. 84. FIRST AND SECOND FLOORS—ADMINISTRATION BUILDING, ST. LUKE'S HOSPITAL.
Edward F. Stevens, Architect; Mellen C. Greeley, Associate Architect.



FIG. 85. ST. LUKE'S HOSPITAL, JACKSONVILLE. ADMINISTRATION AND OPERATING BUILDING.



FIRST FLOOR PLAN
OPERATING PAVILION
NEW GENERAL HOSPITAL
CINCINNATI, OHIO

Scale 1" = 20'



SAMUEL HARRIS & SONS, ARCHITECTS
CINCINNATI, OHIO

FIG. 86.

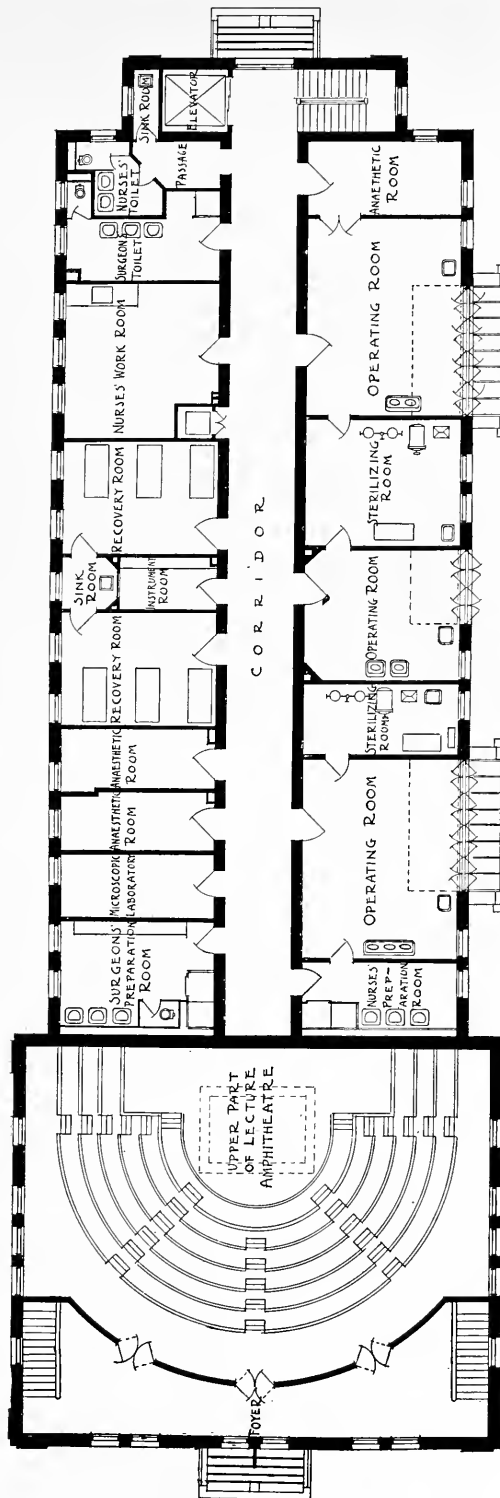


FIG. 87. NEW GENERAL HOSPITAL, CINCINNATI, OHIO. SECOND FLOOR PLAN. OPERATING PAVILION.

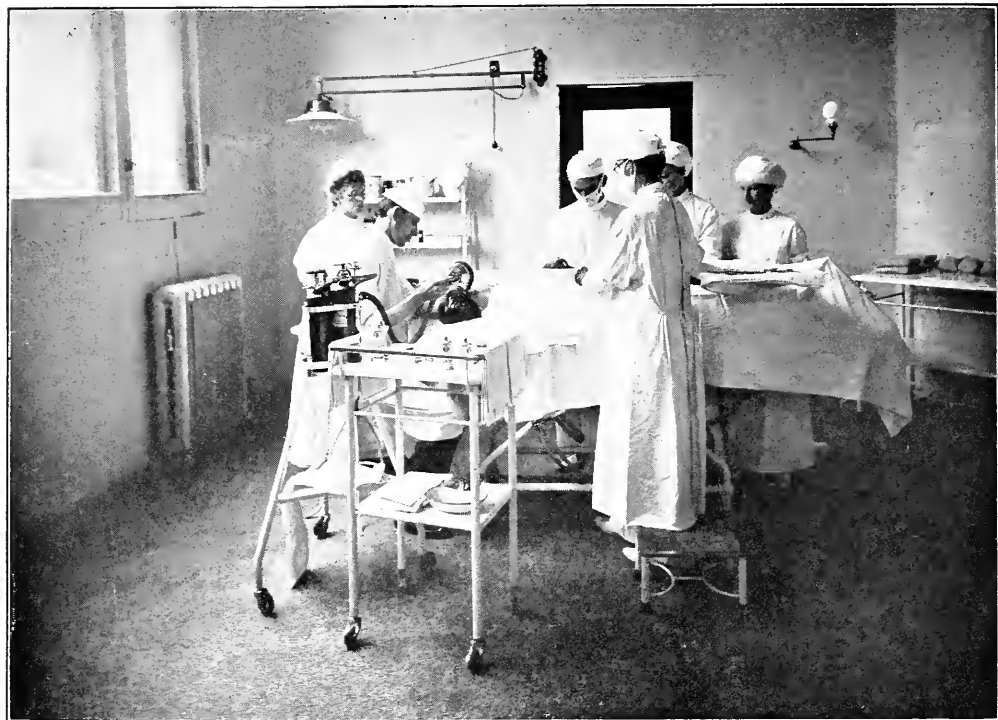


FIG. 88. DR. WILLIAMS' PRIVATE SANATORIUM. VIEW IN OPERATING ROOM.

To illustrate what some of the later European hospitals are doing in the line of medical equipment, a few examples are here shown.

The Virchow, at Berlin (Fig. 1) devotes even more room to the medical treatment department than to the surgical.

At the Barmbeck (Fig. 2), Ruppel's latest hospital, at Hamburg, the bath-house is given the place of honor on the main axis, while the operating pavilion occupies a secondary position.

The Bispebjerg (Fig. 3) at Copenhagen, among the newest large Scandinavian hospitals, has devoted a large space to this department, which is entered by semi-underground passages.

In Munich-Schwabing (Fig. 4), one of Europe's best hospitals, one finds a most complete equipment. If we study this plan in detail. (Fig. 100) we find baths of every kind for the relief of suffering humanity. Commencing at the left are the Roentgen-ray department, the inhalation department, the rest

rooms, pneumatic chamber, massage and mechano-therapy; and in the center are arranged the various baths—the Fango or Italian volcanic earth bath, the mud or peat bath, sand baths where the sand is heated and applied to the patient, the CO² bath, the light bath, and the general hydro-therapeutic room with its spray baths of every description, its warm and cold plunge, and its wading bath.

On the second story of this building is the great sun-bath, so arranged that if the sun is too warm the surface of the glass can be covered by a water curtain, thus reducing the temperature of the room.

In this hospital the writer first saw the pneumatic chamber used for treatment (Fig. 101). A patient needing rarified air and sent to the hospital is placed in one of these rooms, surrounded by his books and papers; pressure in the room is reduced to the prescription amount and he is getting the rarified air of the high mountains at home. Perhaps he may be ordered a greater atmospheric pressure,



FIG. 89. BARRE CITY HOSPITAL, BARRE, VT. VIEW IN MAJOR OPERATING ROOM.
Edward F. Stevens, Architect.

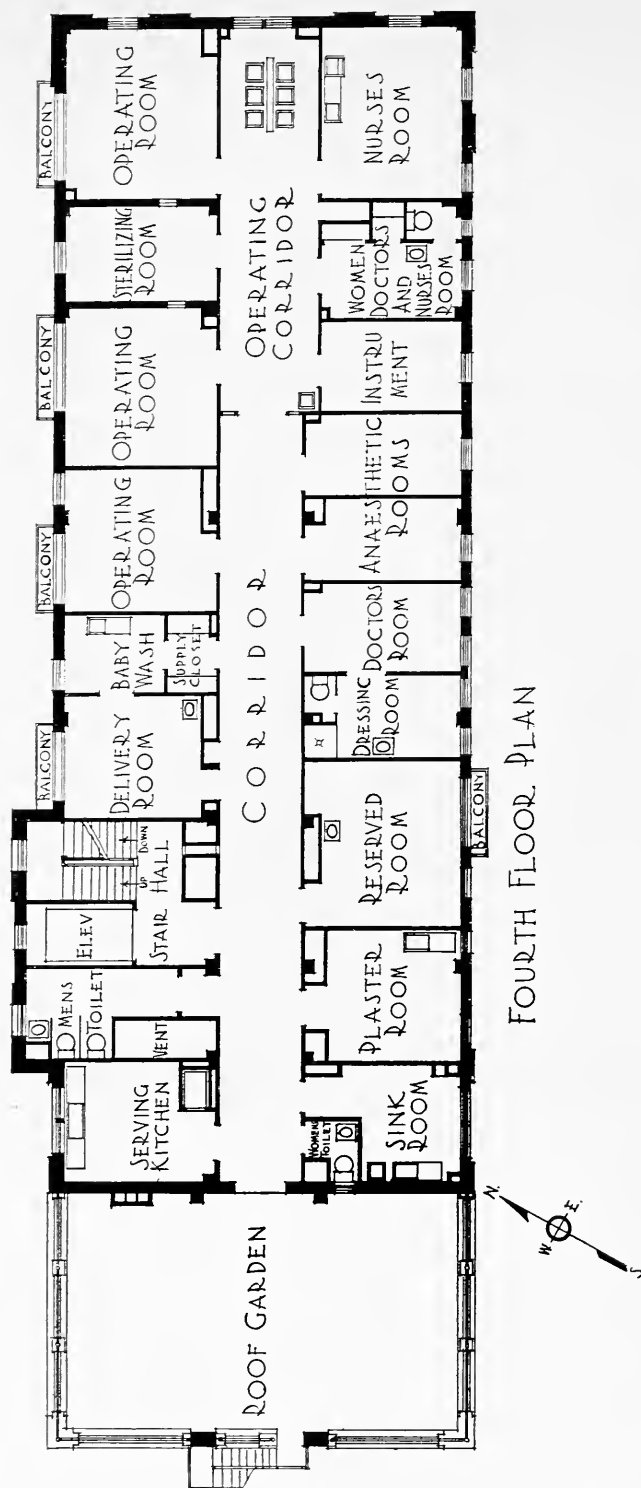


FIG. 91. HAMOT HOSPITAL, ERIE, PENN. OPERATING DEPARTMENT.
Edward F. Stevens and C. Paxton Gady, Associated Architects.

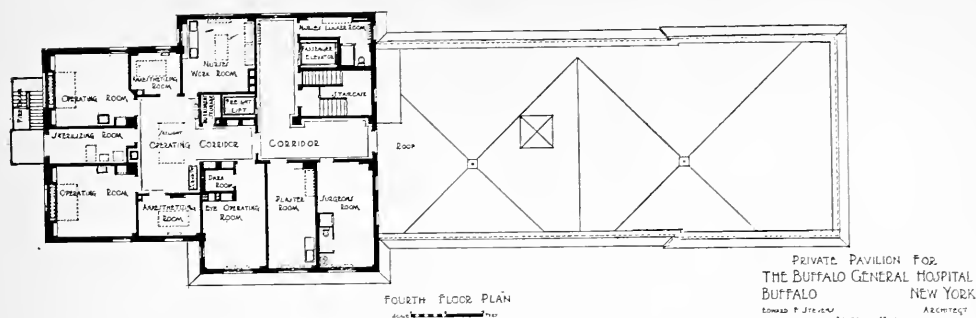


FIG. 92. NEW OPERATING DEPARTMENT.

in which case the chamber is put under pressure instead of suction.

The water bed (Fig. 102) is used for the relief of many troubles and is considered one of the indispensable pieces of equipment. At the St. George the writer saw one poor fellow in the water bed, which he had occupied for months, eating, sleeping and reading, who could not have lived under other conditions. One will see this water-bed, or full-length tub with adjustable hammock, in many wards in Europe. In one hospital that the writer visited each medical ward had its water-bed, and in other wards each bed was provided with pipes from the wall, for cold water circulation in place of ice caps.

The sand bath (Fig. 103), where the patient is packed in sterile sand at the proper temperature, is found in almost every large European hospital.

There are few hospitals in the world, however, which have a more complete mechano-therapy equipment than the Massachusetts General Hospital, Boston, with its splendid Zander room (Fig. 104). But even here the service is largely that of the surgical side.

Today nearly every hospital, large or small, has its Roentgen or X-ray outfit. (See Chapter XI.) In many a more or less complete hydro-therapeutic department is provided.

In discussion with various medical specialists, they have acknowledged the value of equipment and recommend it where possible, especially the full-length continuous bath or water-bed, the hydro-therapy and baking. In designing a new

hospital there should be set apart certain rooms to be reserved for medical treatment rooms, for within a very short time the medical men will demand more equipment.

In the *St. Luke's Hospital* (Fig. 84) at Jacksonville about one-half of the second story of the administration building is set apart for medical treatment. This portion is not equipped, but is ready whenever the demand comes and the funds necessary to equip and maintain it are obtained.

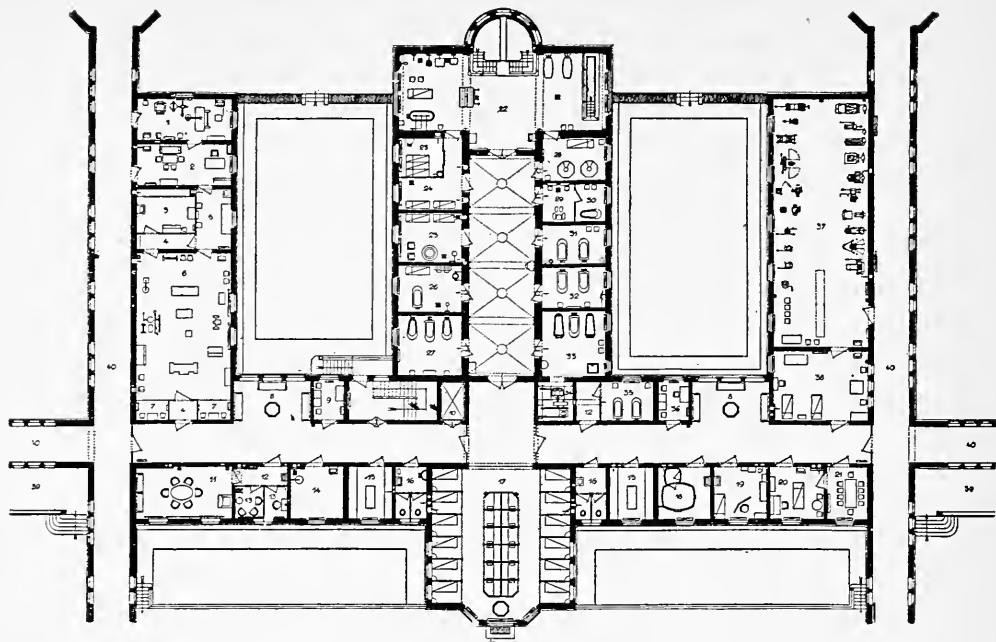
In the *Ohio Valley General Hospital* the same is true (Fig. 16).

In the *Ross Private Pavilion of the Royal Victoria Hospital* (Fig. 65) a large section is set apart and equipped for medical treatment, consisting of a small psychopathic department, Roentgen-ray department, hydro-therapy, electric Nauheim, and continuous baths, rest, and massage rooms.

The Southern Pacific and the San Francisco County (Fig. 106) Hospitals, both at San Francisco, not only have very complete medical equipment but are using it constantly with the best results.

The help given by scientific treatment to the so-called chronic invalids in some of the medical departments of the newer hospitals is referred to as little short of miraculous.

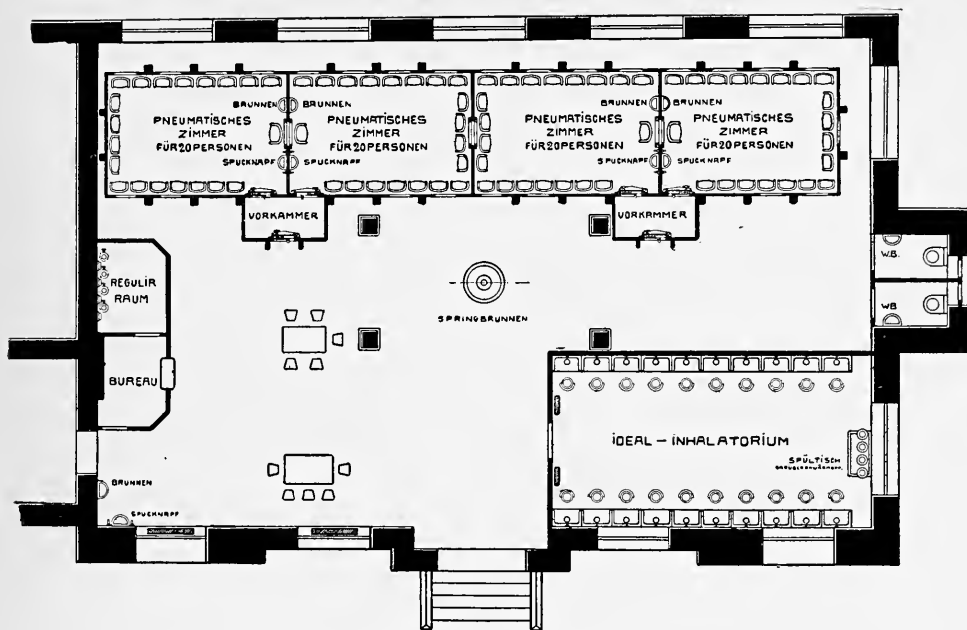
Preventive medicine and treatment are much discussed. Why should not the medical treatment or bath-house department, with its many treatment and rest rooms, soon be as important a factor in our hospitals as our operating department is today?



- | | | |
|---------------------------|-----------------------|------------------------------|
| 1. Roentgen therapeutics. | 15. Wash room. | 29. Four-cell bath. |
| 2. Physicians' room. | 16. Toilet. | 30. Electric water bath. |
| 3. Dark room. | 17. Rest room. | 31. Gas bath. |
| 4. Light shaft. | 18. Pneumatic room. | 32. Salt water bath. |
| 5. Photograph laboratory. | 19. Examination room. | 33. Sand bath. |
| 6. Roentgen room. | 20. Physicians' room. | 34. Sand room. |
| 7. Undressing room. | 21. Ante-room. | 35. Sulphur bath. |
| 8. Waiting room. | 22. Douche room. | 36. Female attendants' room. |
| 9. Attendants' room. | 23. Hot air bath. | 37. Therapeutic gymnastics. |
| 10. Elevator. | 24. Warm air bath. | 38. Massage room. |
| 11. Social room. | 25. Vapor room. | 39. Rest room. |
| 12. Ante-room. | 26. Fango mud bath. | 40. Hallway. |
| 13. Segregated room. | 27. Mud bath. | |
| 14. Light bath. | 28. Heat bath. | |

FIG. 100. GROUND FLOOR PLAN, MEDICAL TREATMENT BUILDING, MUNICH-SCHWABING HOSPITAL, MUNICH, GERMANY.

Richard Schachner, Architect.



PNEUMATIC CHAMBER PLAN.

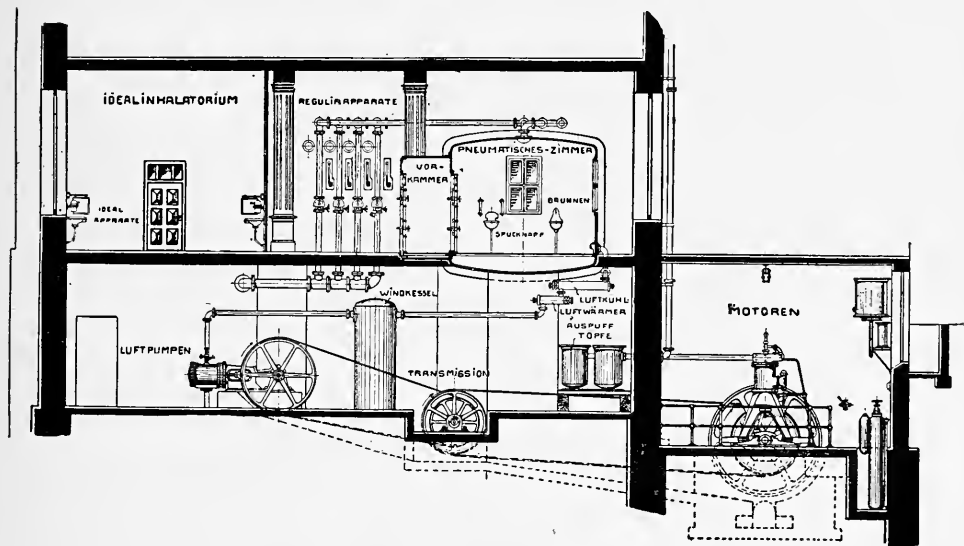


FIG. 101. PNEUMATIC CHAMBER SECTION.

CHAPTER VI.

The Maternity Department

There is a growing call for maternity service in nearly every hospital, whether it be large or small. This has made it necessary to establish an obstetrical department, either by setting apart a section of some building, calling into requisition an existing dwelling near the institution, or erecting a new building or group of buildings for this one service.

Most obstetricians declare that the maternity service should be classed as surgical, since the area of open wound is greater than in almost any other clean surgery, and hence is subject to greater danger of infection from outside. Certainly modern asepsis plays its part in this department, and many a mother owes her health and perhaps her life to the modern methods of care.

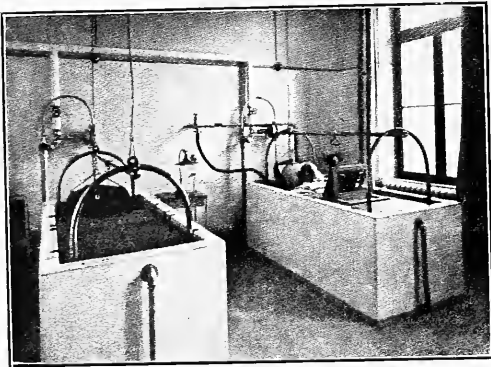


FIG. 102. WATER BED.

That such cases can be more carefully treated in the hospital than in the home no one will gainsay; but to do this to the best advantage the hospital must be especially planned for the work. Study is necessary toward minimizing the noises of preparing and serving food, provision should be made for privacy or semi-

privacy in the wards, and preparation made for emergency conditions.

There are four distinct departments to be considered in planning for obstetrical cases:

1. The waiting department.
2. The delivery or confinement rooms.
3. The puerperal or after-confinement rooms.
4. The creche or nursery.

Waiting Department. With private patients, as a general thing, the patient goes to the hospital but a day or two before or even on the day of delivery, and occupies at once the room or bed that

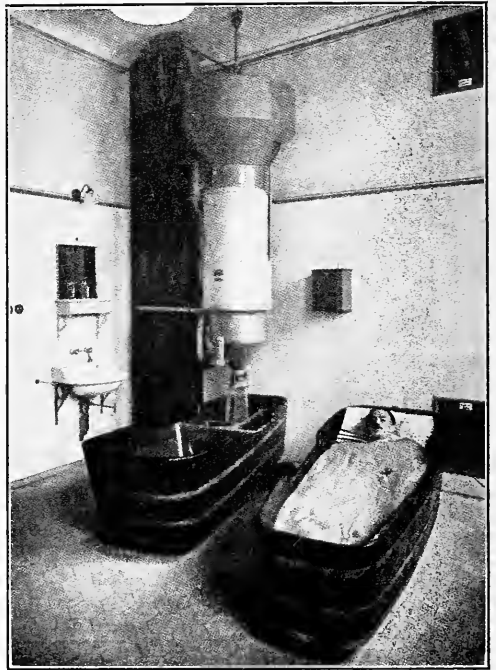


FIG. 103. SAND BATH.

will be hers during her recovery. In hospitals where charity patients predominate the patients frequently enter from

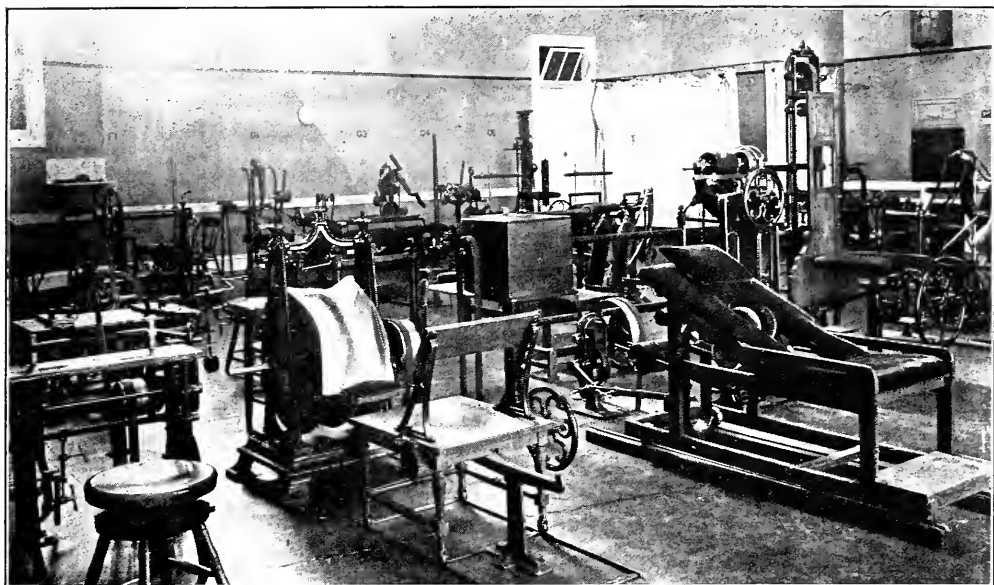


FIG. 104. MASSACHUSETTS GENERAL HOSPITAL. ZANDER ROOM.

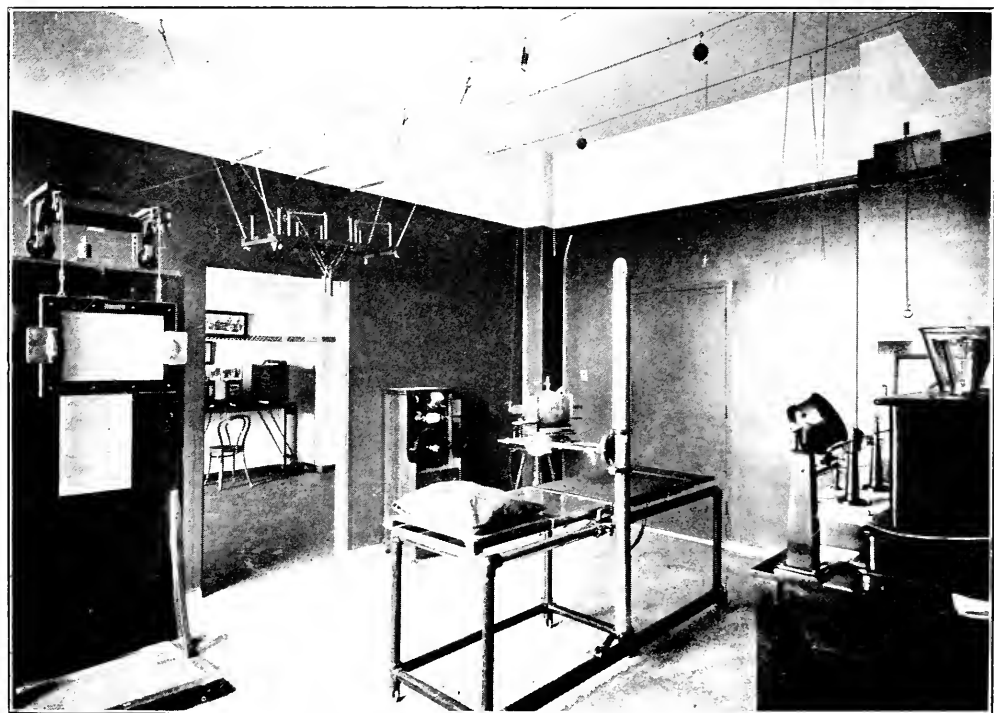
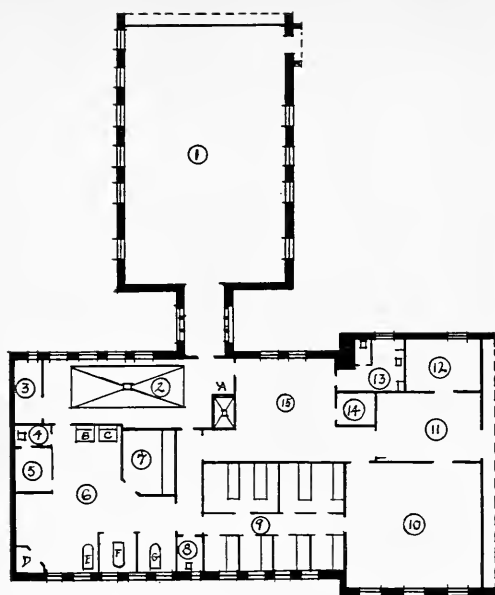


FIG. 105. OHIO VALLEY GENERAL HOSPITAL. ROENTGEN-RAY DEPARTMENT.



San Francisco Hospital.

FIG. 106. MEDICAL TREATMENT DEPARTMENT.

- | | |
|--------------------------|--------------------|
| 1. Mechanical apparatus. | 9. Dressing rooms. |
| 2. Plunge bath. | 10. Lounge room. |
| 3. Pump room. | 11. Hall. |
| 4. Toilet. | 12. Store room. |
| 5. Irrigation room. | 13. Toilet. |
| 6. Douche room. | 14. Closet. |
| 7. Steam room. | 15. Office. |
| 8. Toilet. | |

one to three months before confinement. Such women assist about the hospital work and in a measure repay for their care when sick. Where such a practice prevails separate wards or dormitories must be provided. In charity homes for unfortunate girls the situation is the same, and in many the waiting departments are larger than the hospital proper. The location of this department in the hospital group should have most careful study for two reasons:

1st—Because, owing to the crying of the infants, it can well be called the most noisy of all of the departments; and

2nd—Because, owing to the possible danger of infection from outside sources, it should be as far removed as possible from the other buildings, and should not be used as a passageway to any other buildings.

Delivery Rooms. The delivery rooms,

with their sterilizing rooms, labor rooms, doctors' waiting room, etc., should be cut off from the rest of the department by doors. This department should be treated in its details like an operating suite.

The delivery rooms should be large, well lighted, and well ventilated; should in fact be operating rooms with all the careful finish and detail, and should be equipped both for day and for night work.

Either a special sterilizing room should be provided, or sterilizers for water, utensils and instruments must be placed in the delivery room.

There should be at least one scrub-up sink in or near each delivery room. In hospitals where mixed cases are taken it is considered wise to provide separate delivery rooms for the different classes.

Patients' Rooms. If open wards are used, it is well to have them small; or, if the ward is large, subdivided by fixed screens. A certain number of private rooms should be provided, and perhaps a few suites with baths. The finish and detail, toilets, sinks, baths, etc., should be similar to those of the surgical wards of the hospital.

Airing balconies should be provided as in the medical and surgical wards, or solaria can be added if found desirable.

There should be opportunity for the isolating of the occasional cases which may be infected. A simple suite of two rooms and a bath, which will serve as a general utility room, should be arranged on a separate corridor entered from the main corridor, and with an outside entrance as well, if possible. This arrangement will give opportunity for such isolation but will not prevent the use of these rooms for regular work. The rooms should be treated and equipped the same as isolation wards for contagious cases.

Creche or Nursery. The nursery should be light, well-ventilated, cheerful and warm, and well away from the mothers. There should be not only space for a separate bassinet for each baby, but a separate room for bathing and dressing. A balcony should connect with this room, so that the babies may be easily

kept out of doors in suitable weather. Linen closet, blanket warmer, linen dryer, etc., should be planned. If the department is large a creche may be provided for ward babies and another for those belonging to private patients.

A few concrete examples will serve to illustrate. In the *Newton Hospital* (Fig. 403), Newton, Mass., the maternity service is cared for in a building recently

On the third floor are the delivery rooms for ward and for private patients, with sterilizing room between. A nurses' duty room, guests' rooms, isolating room, toilets and storeroom complete this floor.

The Talitha Cumi Maternity (Fig. 408) Jamaica Plain, Mass., is an institution for unfortunate girls. The waiting department is larger than the hospital proper, and is arranged as an industrial home.

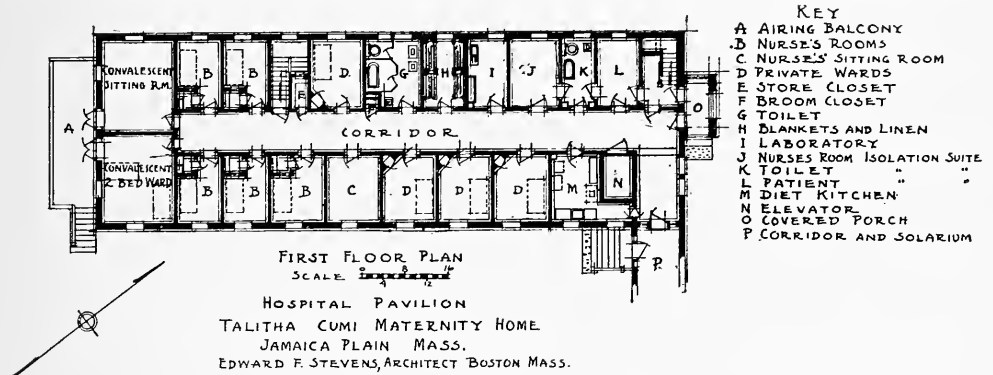


FIG. 111.

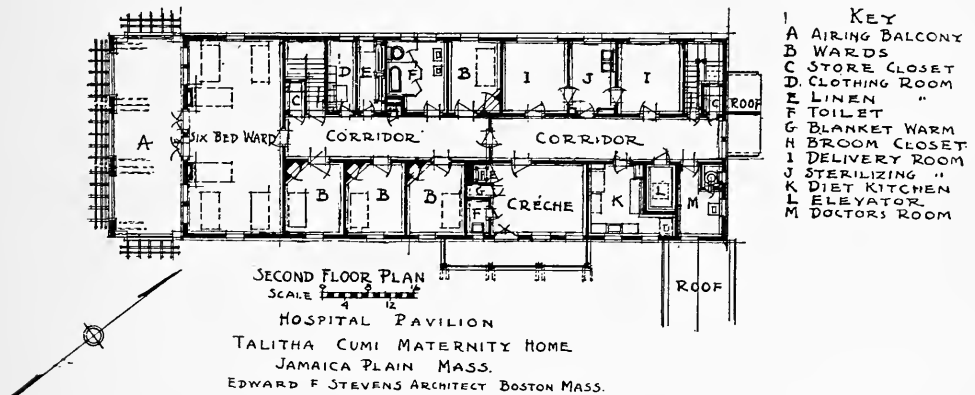


FIG. 112.

erected in memory of the founders of the institution. This building is connected with the main group by an underground passage, and on the first floor by an open corridor.

The public ward is on the first floor, together with four private rooms. There are baby rooms, diet kitchen, toilets, linen and medicine closets.

The second floor is devoted to private rooms. The creche is on the south, with its own airing balcony.

In this building are the offices of the institution, the kitchen, and dining-rooms. The hospital proper is connected with the waiting department by a closed corridor.

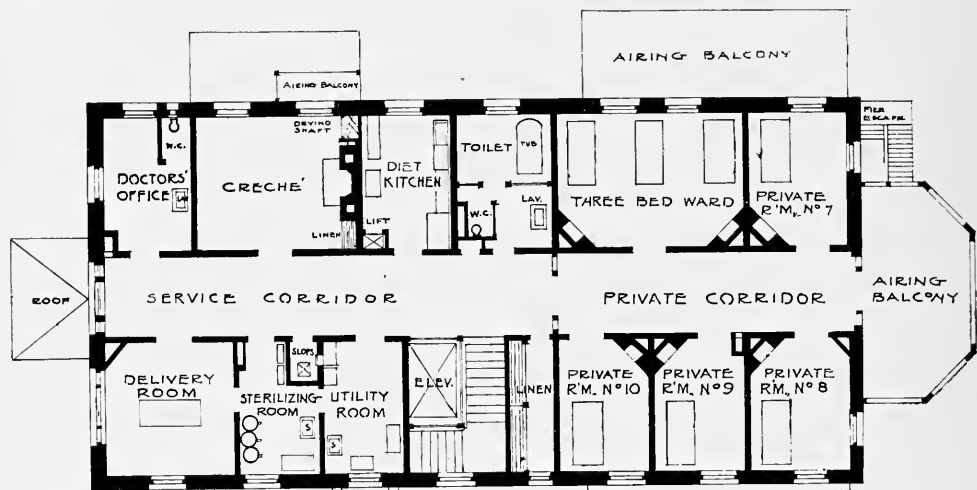
On the first floor of the hospital building (Fig. 111) is a six-bed ward, three private rooms, and an isolating suite so arranged that the doors leading into the corridor can be closed and the suite reached from the service staircase and from out-of-doors. There are toilets, bath, linen room, diet kitchen, and creche

on this floor. An airing balcony and a solarium afford outdoor facilities.

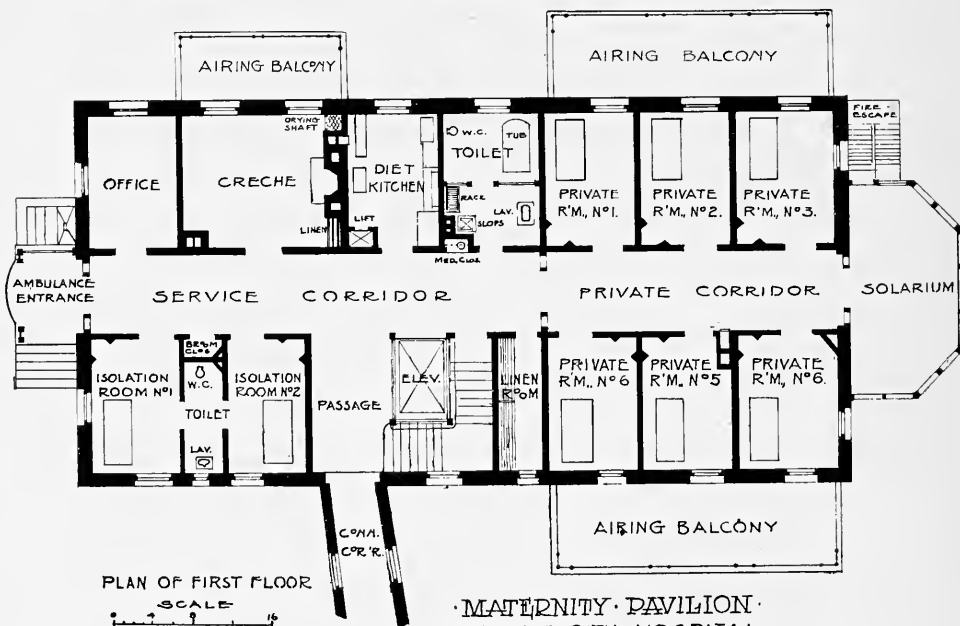
The second floor (Fig. 112) is similar, except that the delivery rooms replace the isolating suite. There are two delivery rooms connected by the sterilizing room, and a doctors' room across the hall. The delivery rooms are cut off from the patients' part of the hospital by double doors.

Meadville Hospital, Meadville, Penn., has a separate pavilion for the maternity service (Fig. 113). This pavilion is at the extreme end of a group of buildings. It is two stories in height, with elevator.

There is but one public ward, the remainder of the patients being in private rooms. On the first floor is an isolation suite and a nurses' office. The delivery room, sterilizing room, doctors' room,



PLAN OF SECOND FLOOR.



PLAN OF FIRST FLOOR

SCALE
0 4 8 12 16

· MATERNITY · PAVILION ·
· MEADVILLE · CITY · HOSPITAL ·
· MEADVILLE ·, PENN ·
· EDWARD · F · STEVENS · ARCHITECT
· BOSTON · MASS ·

FIG. 113.



FIG. 114. CRECHE-MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.



FIG. 115. MATERNITY OPERATING ROOM—BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

etc., are on the second floor. Each floor has a creche, which contains an unusual feature, a fireplace. There are the usual airing balconies and a solarium.

In the maternity department of the *Bridgeport Hospital* (Figs. 44 and 45) the ward unit is somewhat different from that of any of the other hospitals mentioned in this chapter. In the main sixteen-bed ward the principle adopted in the Rigs Hospital is introduced—that is, there are four groups of four beds each, and these groups are divided by stationary glazed screens six feet in height, giving the semi-isolation needed in these rooms.

The creche (Fig. 114), as well as the serving-kitchen and sink-room, is at a distance from the ward and private-room patients.

In this plan an admitting unit is provided, in which the careful examination and bathing of patients are conducted. Adjoining this admitting unit is the isolation unit, in which any suspicious case can be kept for observation. This isola-

tion department is connected with the serving kitchen of the children's department by a slide. Directly under the slide is the dish sterilizer, the cover of which is controlled from both sides of the partition, so that the infected china can be returned through the dish sterilizer.

The children's ward unit in this building is similar to the maternity ward unit, except that the screens are of clear glass, permitting the nurse on duty to have close observation of all the children and still affording the necessary isolation.

The maternity department of the *Ohio Valley General Hospital* (Fig. 77) is situated at the end of one of the wings and consists of wards and private rooms, two delivery rooms, a creche, and waiting room. Cases needing isolation are taken to the isolating department in the same building.

At the *St. Luke's Hospital* (Figs. 116 and 117), New Bedford, this service is taken care of in a separate building, with a nearly ideal arrangement of rooms and service.

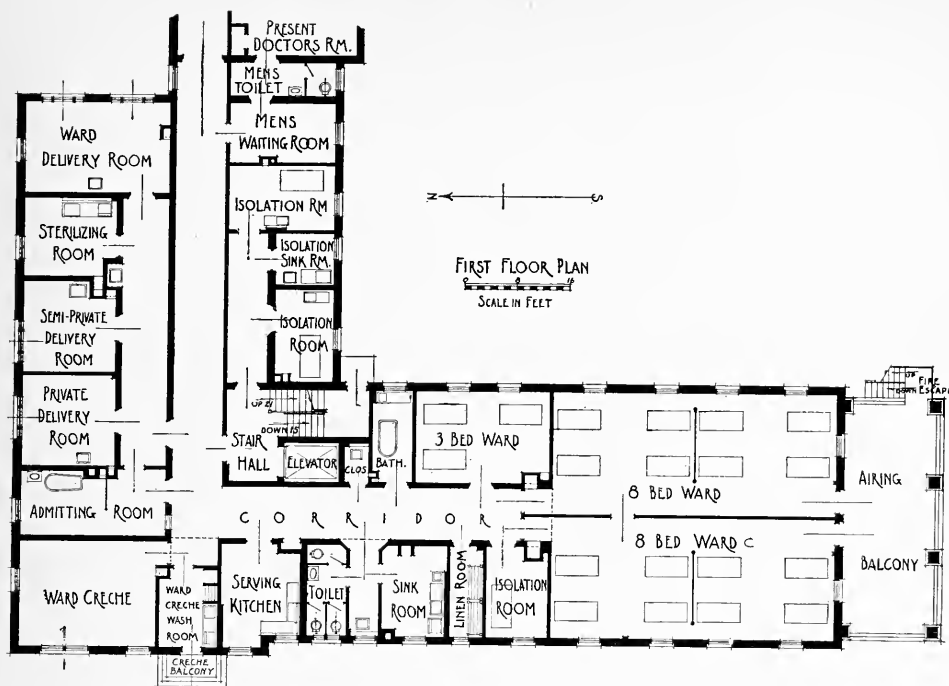


FIG. 116. ST. LUKE'S HOSPITAL, NEW BEDFORD. MATERNITY DEPARTMENT.
Edward F. Stevens, Architect.



FIG. 117. ST. LUKE'S HOSPITAL, NEW BEDFORD. MATERNITY DEPARTMENT.
Edward F. Stevens, Architect.

Placed at the extreme end of the group and adjoining the ambulance entrance of the operating department, the admitting service is simple. The staff sitting-room at this point makes a special waiting-room unnecessary. There is, however, a husbands' waiting-room provided for the anxious fathers-to-be.

The admitting room, with entrance bath, adjoins the delivery corridor. There are three delivery rooms for the three services—public, semi-private, and private.

The public wards, two of eight beds each, accommodate the only patients on the first floor, except the occasional isolated case, access for which is from a separate corridor. These ward beds are separated into groups of four by screens, upon which are located the nurses' calls and bedside lights.

The *Chicago Lying-in Hospital* (Figs. 120 and 121) is planned on the broad, generous basis of the comfort of the patient, the isolation of sound, and the convenience of management. The nurses' station, located as it is at the crossing of the corridor at the elevator entrance, makes possible the easy surveillance of the entire floor. The nursery and service

rooms are placed with regard to care and easy service.

On the sixth floor (Fig. 121) are located the operating section, the birth and labor rooms, so placed as to allow the utmost flexibility of service and at the same time the utmost privacy when privacy is required.

The sterilizing and nurses' room is centrally located. There is a waiting room for the husband and expectant father.

The *Wesson Maternity Hospital* (Figs. 122-125) consists of three fireproof buildings and is a complete hospital unit. The plans of the patients' pavilion, nurses' home, and power plant, show the general relation of one department to the others.

The maternity department of the *Yonkers Homeopathic Hospital* at Yonkers, N. Y. (Figs. 126-130), is a self-contained building of fireproof construction. It is used for clean surgical cases as well as for obstetrical service, and contains the administration offices and the superintendent's living apartments.

For smaller units in private hospitals see plans of Macon Hospital (Fig. 55a), Melrose Hospital (Fig. 252), and San Francisco Hospital (Fig. 118).

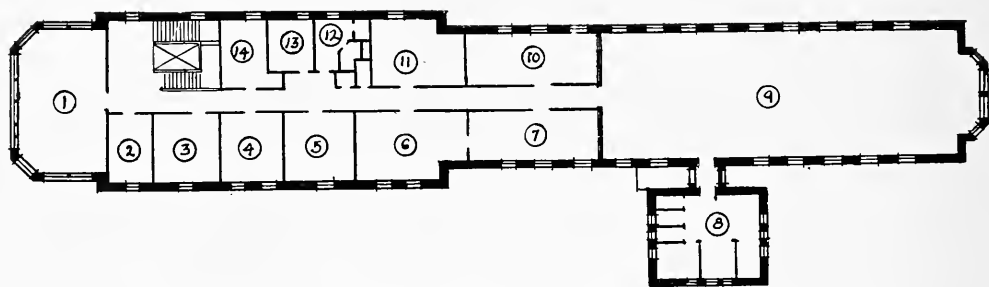


FIG. 118. SAN FRANCISCO HOSPITAL. MATERNITY WARD.

Newton J. Tharp, Architect.

1. Patients' waiting room.
2. Doctors' dressing room.
3. Isolation room No. 1.
4. Isolation room No. 2.
5. Diet kitchen.

6. Delivery room.
7. Nursery.
8. Toilet.
9. Ward.
10. Nursery.

11. First stage room.
12. Toilet.
13. Nurses' Supplies.
14. Laboratory.

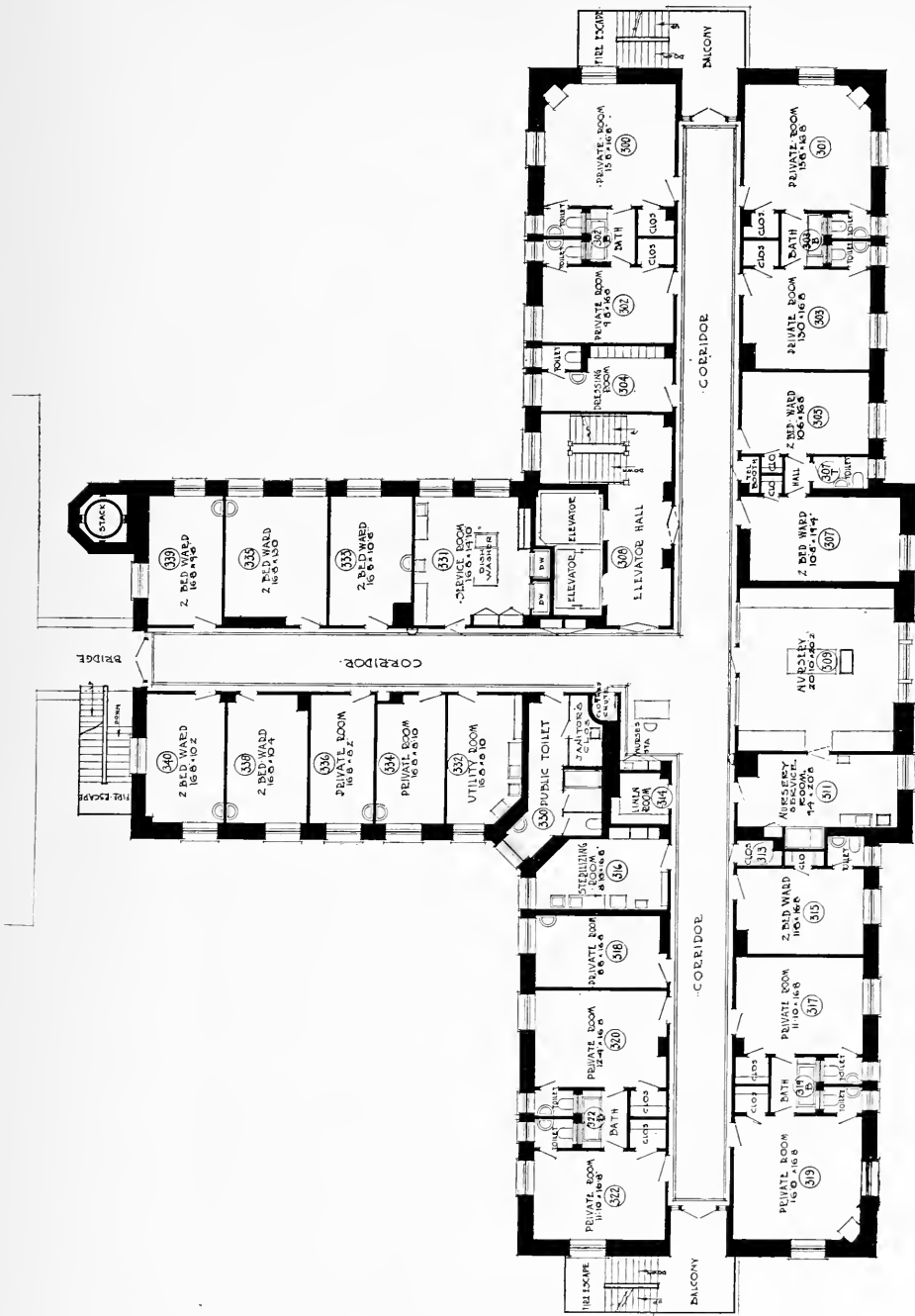


FIG. 120. CHICAGO LYING-IN HOSPITAL. THIRD FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects.

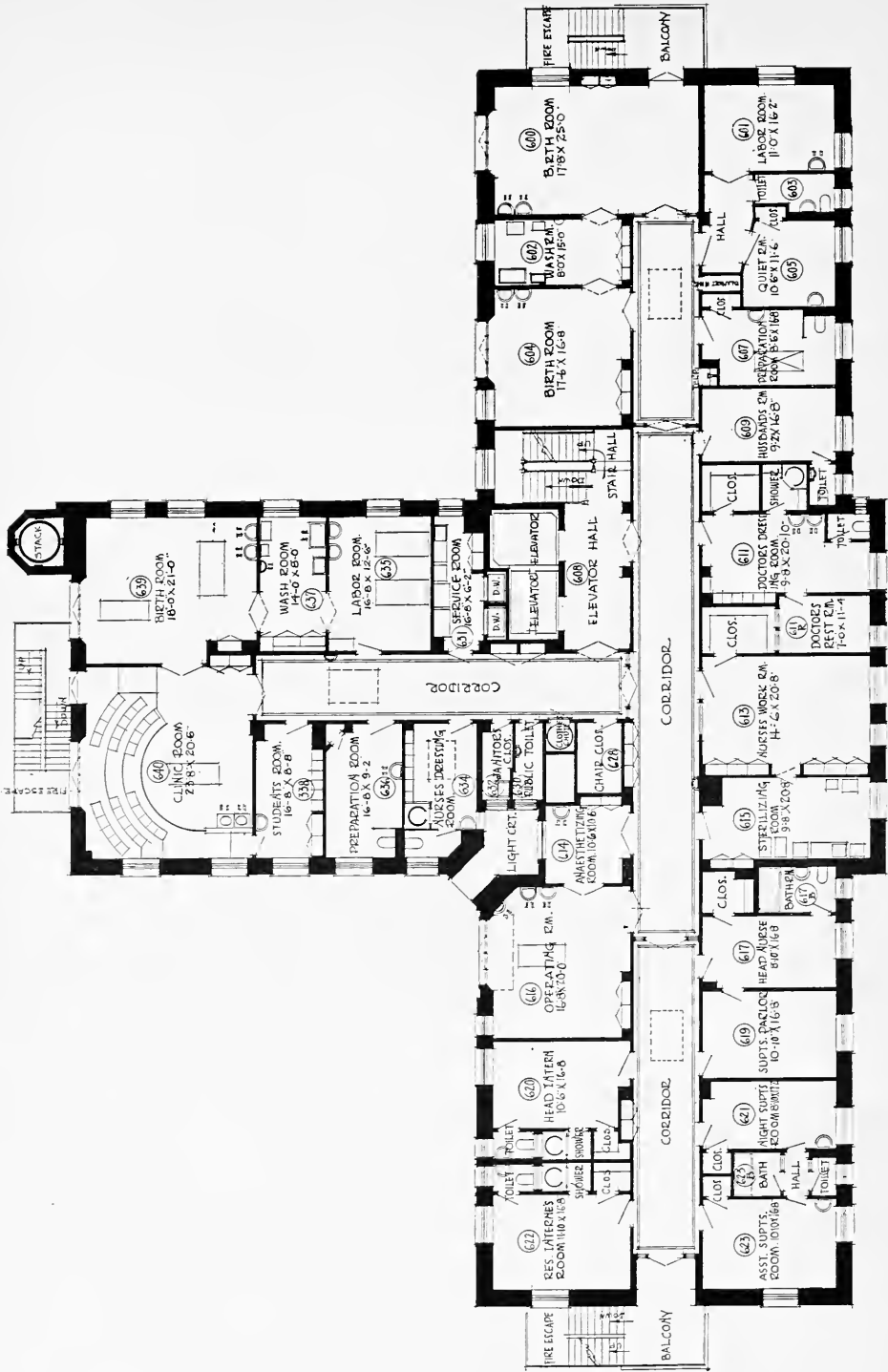


FIG. 121. CHICAGO LYING-IN HOSPITAL. SIXTH FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects.

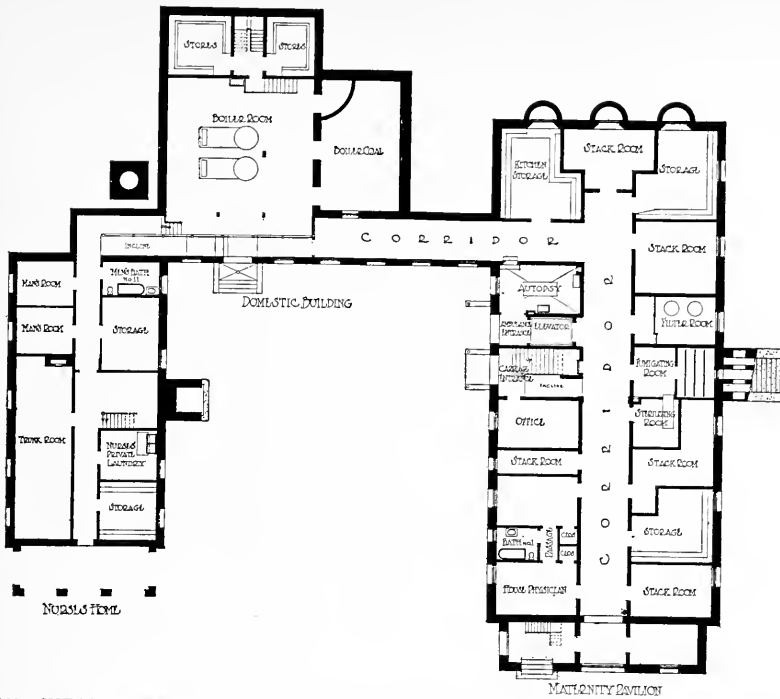


FIG. 122. WESSON MATERNITY HOSPITAL, SPRINGFIELD, MASS. FIRST FLOOR PLAN.
Kendall, Taylor & Stevens, Architects.

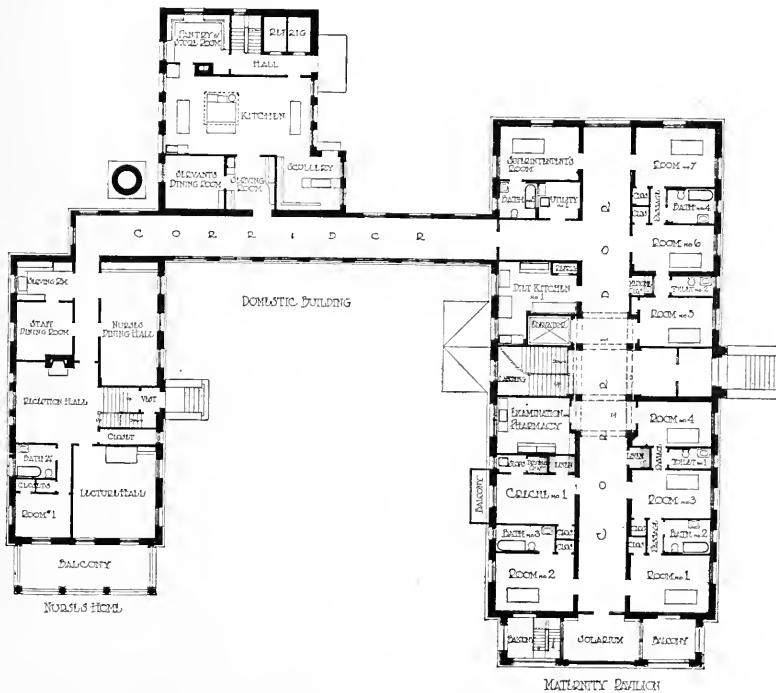
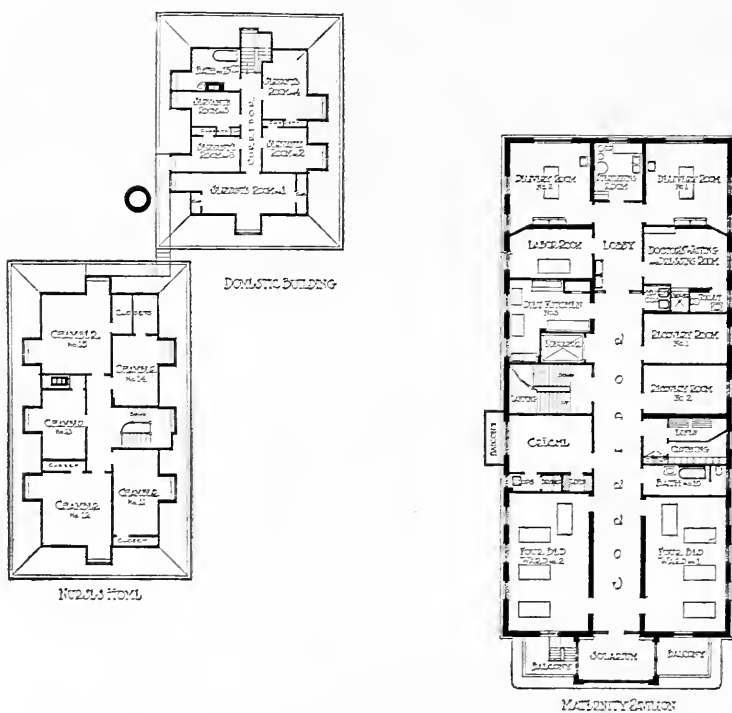
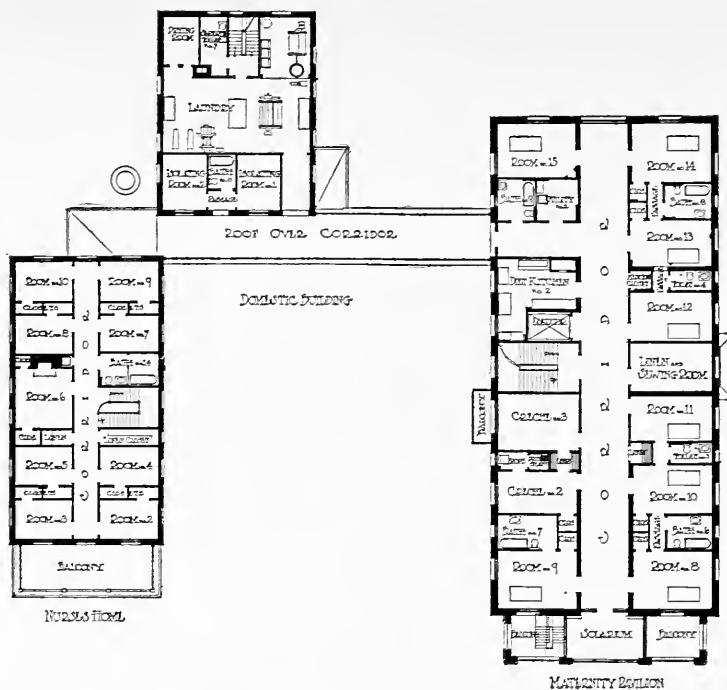
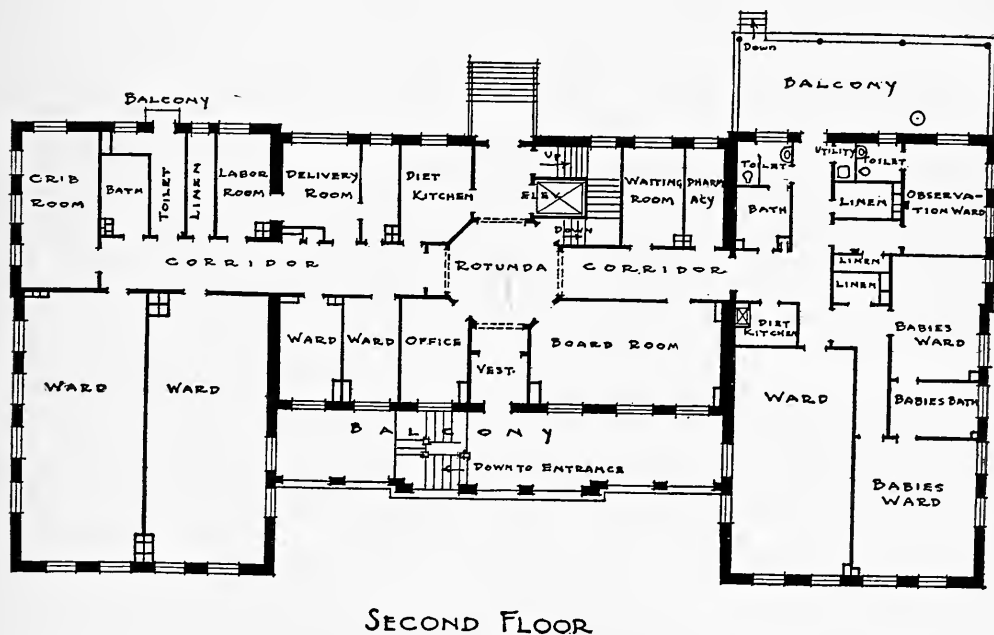
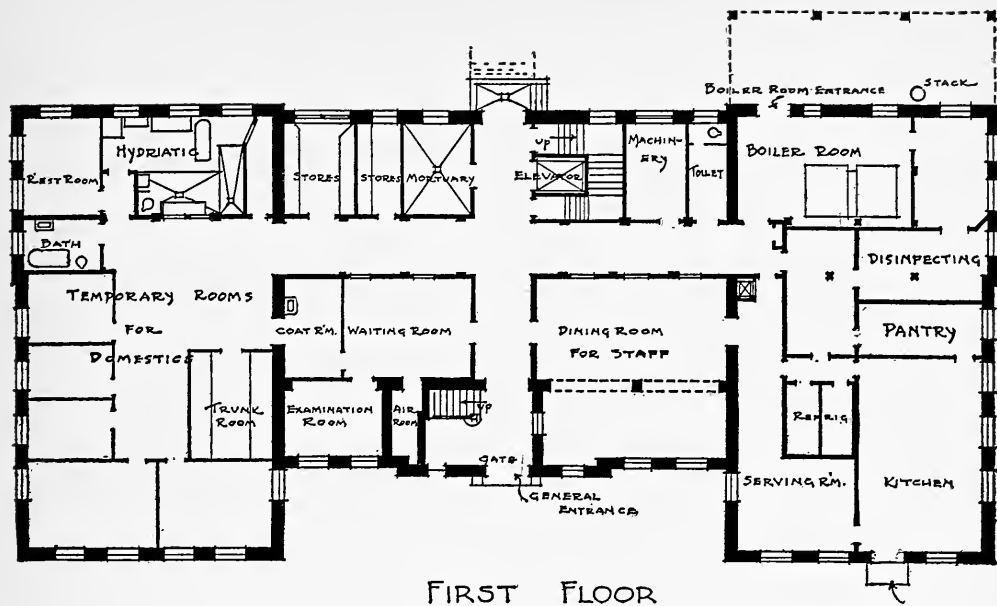
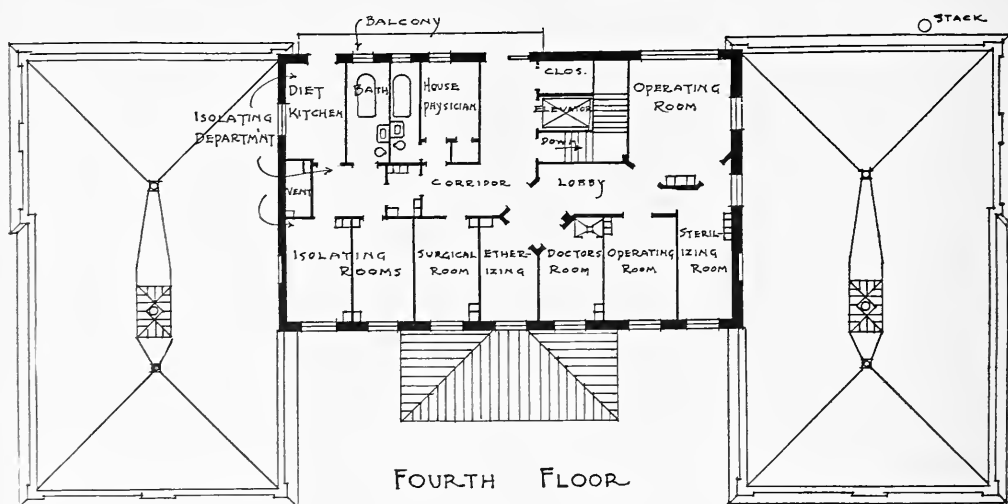
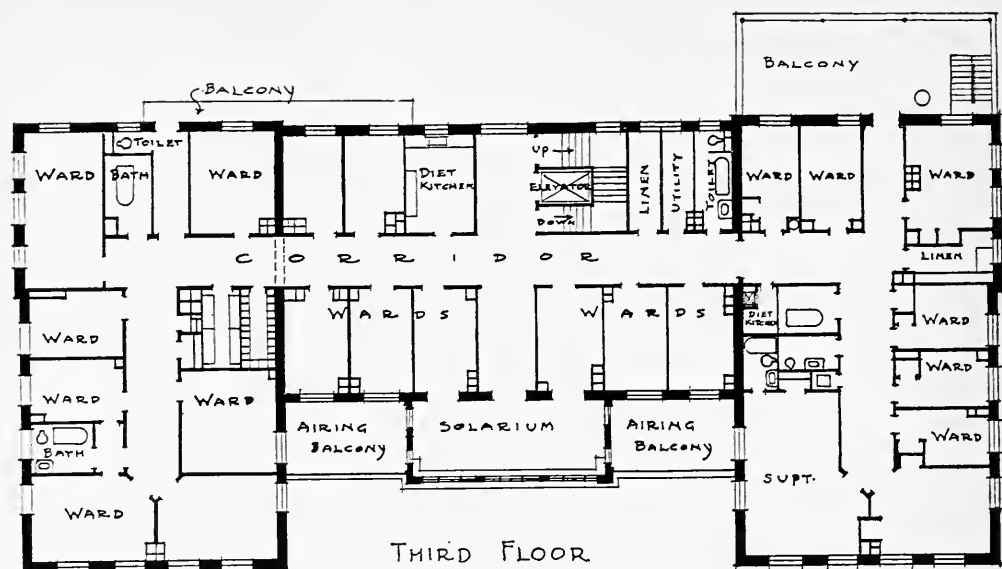


FIG. 123. WESSON MATERNITY HOSPITAL, SPRINGFIELD, MASS. SECOND FLOOR PLAN.
Kendall, Taylor & Stevens, Architects.





FIGS. 126 AND 127. FLOOR PLANS—YONKERS HOMEOPATHIC HOSPITAL, YONKERS, N. Y.
Kendall, Taylor & Stevens, Architects.



FIGS. 128 AND 129. FLOOR PLANS—YONKERS HOMEOPATHIC HOSPITAL, YONKERS, N. Y.
Kendall, Taylor & Stevens, Architects.

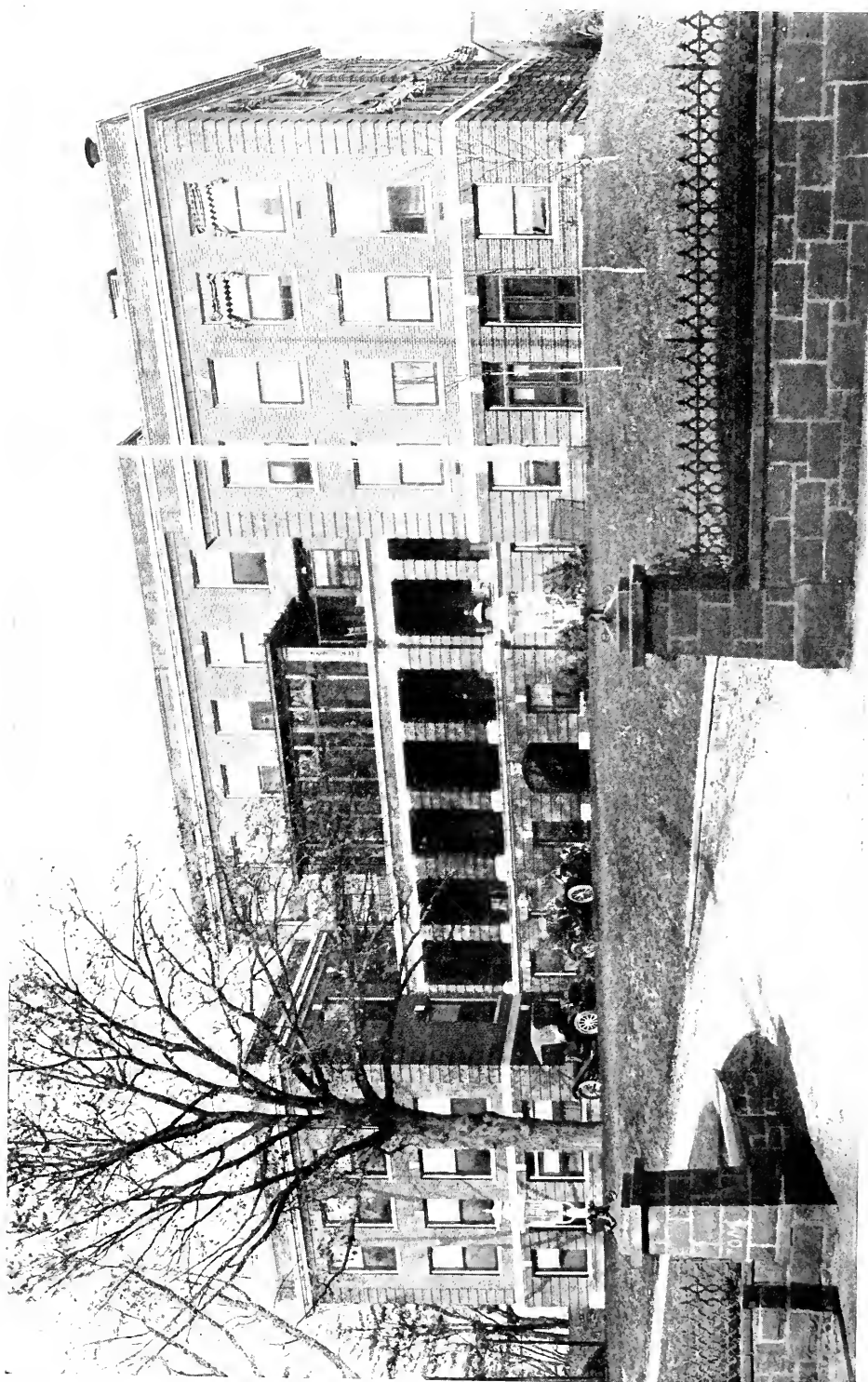


FIG. 130. YONKERS HOMEOPATHIC HOSPITAL, YONKERS, N. Y.
Kendall, Taylor & Stevens, Architects.



"A LITTLE CHILD SHALL LEAD THEM."

CHAPTER VII.

Children's Hospitals

In planning for a children's hospital or a children's department of a general hospital we have new conditions that do not exist in any of the other departments, for we are dealing with suspicious cases where the only logical treatment is to consider every case as having been exposed to some contagious disease and to provide proper isolation for the study of every patient. To that end the admitting department should have a sufficient number of subdivisions so that each case may be temporarily isolated until a careful diagnosis can be made. During the usual period of incubation the children should be placed in an observation ward, with the beds so separated by screens, or otherwise, as to prevent the contact of one patient with another. These screens may be made of glass, or glazed cubicles can be provided that will give segregation and the necessary isolation.

Where a children's department is placed in a general hospital, be the department ever so small, it should be separated from that portion of the hospital occupied by adults, which should be assured freedom from the noises coming from the children's ward and safety from the danger of infection.

The necessity of providing private rooms is not so great in the children's hospital as in the adults', for it is found that children are much happier if they can be with others, as their attention is taken from themselves and they are likely to forget their own discomfort in seeing the discomfort of others. Even in the general wards, however, outside of the observation ward, a certain segregation or grouping is desirable. A glass screen partition between every three or four beds gives a sufficient amount of separation, but it is not desirable to have wards larger than from sixteen to twenty beds.

As with the adult, every ward unit should be supplied with one or two quiet rooms for the very sick. These rooms can be glazed so that the nurse from the corridor may watch the patient without the necessity of entering the room.

One of the essentials in a children's ward unit is the day room or play room, for in this the little convalescents are freer to romp as much as their infirmities will allow and to gather what comfort they can from the toys furnished them. The floor covering of this room should be some warm material—linoleum or cork carpet, for instance, or even cork tile.

The serving kitchen and sink room should be very little different from those provided for the adult ward units. The toilet and bath facilities, however, should be entirely different. The waterclosets should be low and easily accessible. For bathing, the shallow tub or slab tub affords the most convenient method of washing children. Without undue effort on the part of the attending nurse the children can be washed in clean running water through a spray attached to a rubber hose. The temperature of the water can be controlled either by a control device or by a large storage tank placed directly above the bathing slab. By using this method the patient is never washed in dirty or poisoned water, as is the case in bathing in a filled tub. (See Chapter XV, "Plumbing.") In this bathing room should be placed a cabinet for the toilet articles of each individual child. This should be divided into compartments and should contain the usual mug, tooth brush, comb, and hair brush.

A simple device to hold the toilet articles of the children, devised by Mr. Bartine, Superintendent of the Ruptured and Crippled Children's Hospital in New York, may be hung on the end of each bed. This contains not only the toilet

articles, but the towel also. Of course this necessitates the taking of these articles to the toilet room when they are to be used.

The prevalence of contagious diseases in a children's hospital is so much greater than in the hospital of the adult that it is desirable to have a section of the hospital planned and set apart for the care of such diseases. This department should be treated the same as the contagious hospital—that is, there should be

children can sometimes be quieted more easily by pictures on the walls than in any other way. Simple illustrations from Mother Goose, stenciled at a convenient height for the children to look at, is one way of providing for this. One of the most attractive wards which the writer has ever seen was in the children's department of the *St. Thomas Hospital* in London (Fig. 132). Here the walls were lined the entire height with tiles depicting interesting incidents in child



FIG. 132. ST. THOMAS' HOSPITAL, LONDON. CHILDREN'S WARD.

a certain number of cubicles or rooms where each individual bed is screened, and the same care maintained in the treatment of cases as in the contagious hospital.

Here the orthopedic service is, as a general thing, greater than in the hospital for adults, and it is decided economy, if the hospital is large, to have a department for the manufacture of corrective apparatus, as is well illustrated in the Hospital for Sick Children in Toronto and in the Ruptured and Crippled Children's Hospital in New York, which will be mentioned later in this chapter.

The requirements for operating rooms and surgical dressing rooms do not differ from those described in the chapter on the ward unit.

The question of color and decoration is one which requires careful study. The

life. The admitting room of the *Forsyth Dental Clinic* (Figs. 133 and 134) in Boston is another good example of ceramic decoration.

A few examples of children's hospitals and departments will serve to illustrate some of the points which are mentioned.

In the children's clinic of the Dusseldorf Hospital, at the entrance is a small hospital isolation department of four beds, for the observation of doubtful cases. The ground floor is for the accommodation of infants and has an interesting incubator department consisting of six cells or tiny rooms, each for two cots. The lower portion is constructed of marble and the upper of two layers of glass, with elaborate apparatus for controlling the temperature, humidity and ventilation of each cell from the corridor. The utensils are contained in glazed compartments at the head of each bed. The

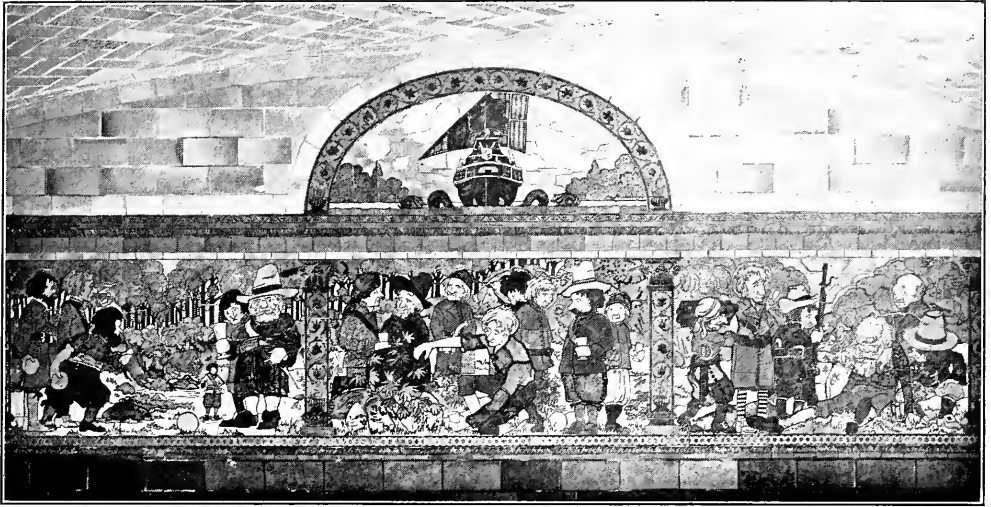


FIG. 133. FORSYTH DENTAL INFIRMARY, BOSTON. CERAMIC FRIEZE IN WAITING ROOM.
Edward P. Graham, Architect.

first floor of the clinic contains the wards for the older children.

The Harriet Lane Home for Invalid Children (Fig. 135 and Fig. 136) (the children's department of the Johns Hopkins Hospital), planned by Mr. Charles Butler of New York (in collaboration with Wyatt & Nolting of Balti-

more), to whom the writer is indebted for the data, is worked out most carefully to provide for proper observation and segregation. This plan consists of the main building, with three small ward units. The patient enters through the main admitting room, with the examining rooms adjoining. Suspicious cases

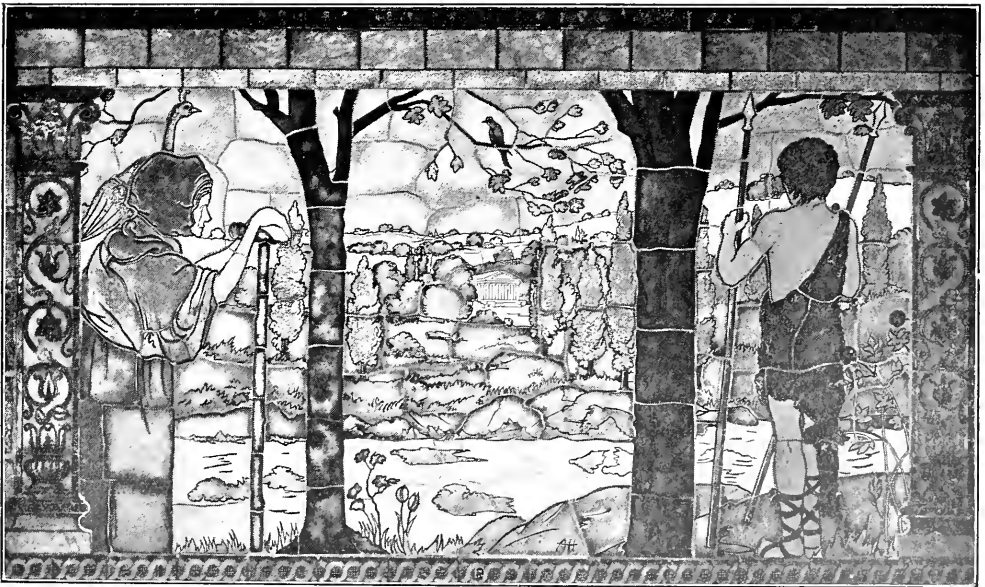


FIG. 134. FORSYTH DENTAL INFIRMARY, BOSTON. CERAMIC FRIEZE IN WAITING ROOM.

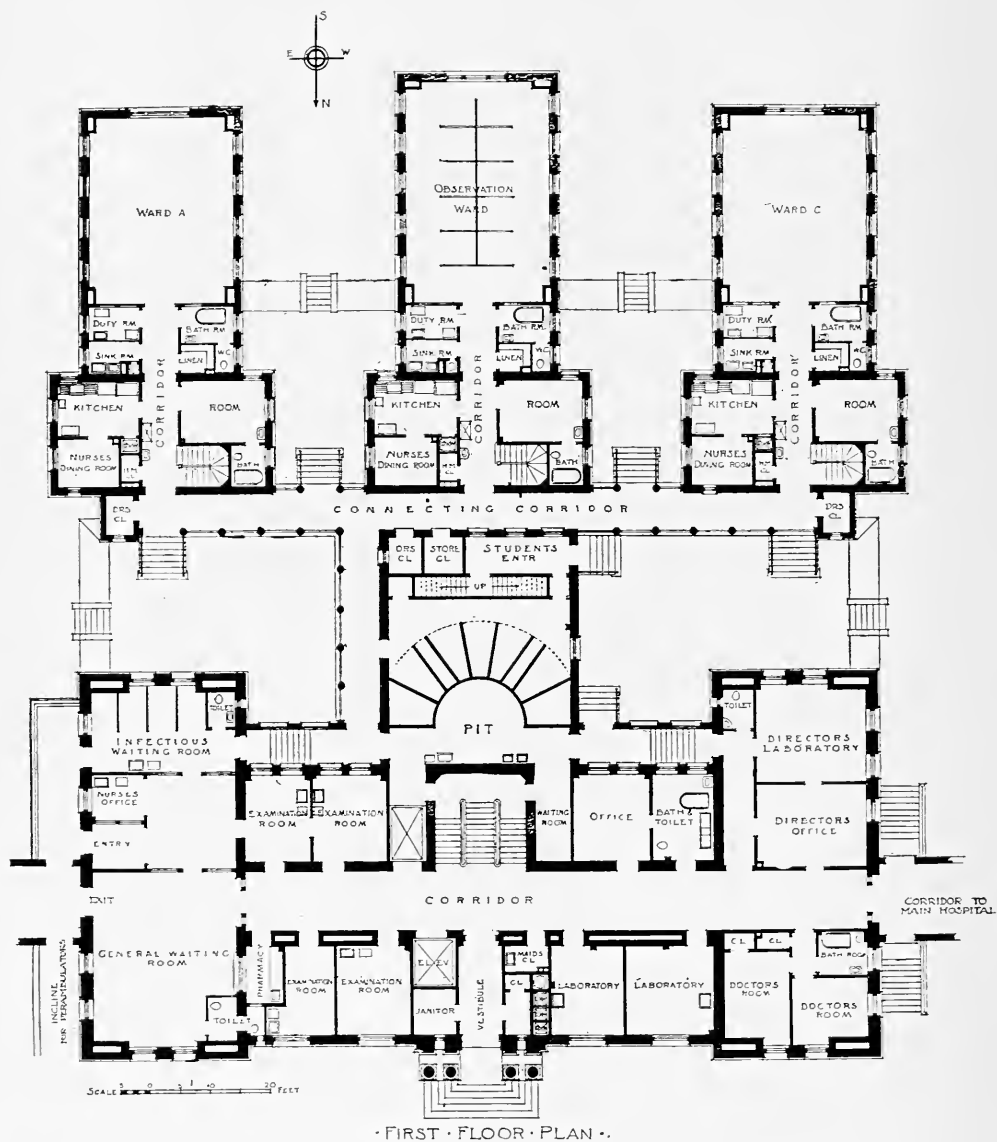


FIG 135. HARRIET LANE HOME FOR INVALID CHILDREN.
Wyatt & Nolting, Butler & Rodman, Associated Architects.

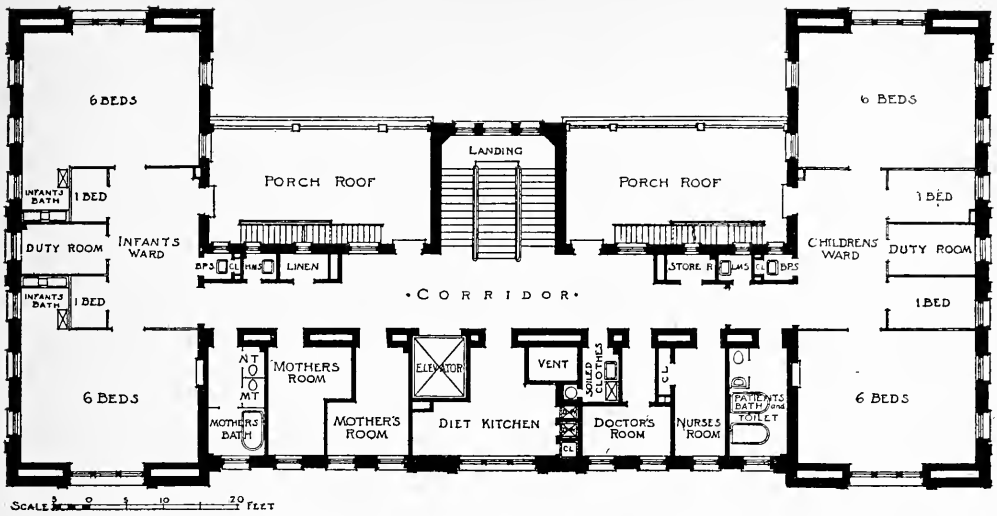


FIG. 136. JOHNS HOPKINS HOSPITAL. HARRIET LANE HOME FOR INVALID CHILDREN.
Wyatt & Nolting, Butler & Rodman, Associated Architects.

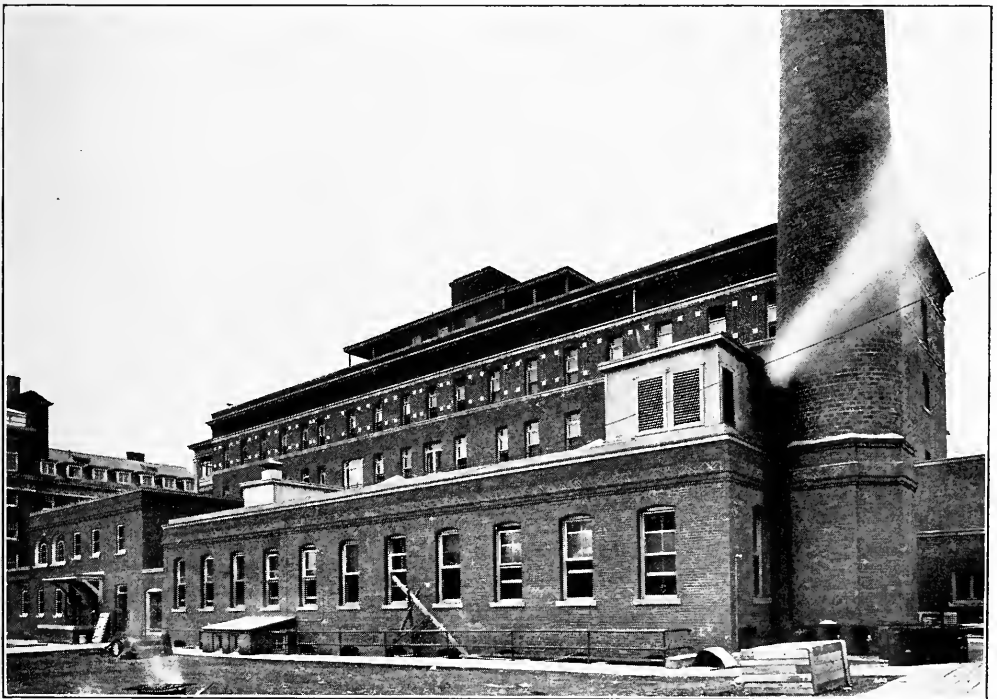


FIG 138. HOSPITAL FOR SICK CHILDREN, TORONTO, CANADA. ISOLATION PAVILION.
Stevens & Lee, Architects.

are admitted through what is termed the infectious waiting-room, and one of the three wards provided is for observation purposes. In this, each bed is screened from its neighbor by a close glass and metal screen. Each of these ward units contains a duty room, sink room, bath room, isolation room, and a serving kitchen with nurses' dining-room adjoining.

Perhaps no children's hospital in this part of the world is doing greater work than *The Hospital for Sick Children*, at Toronto, which administers more to poor children than to the children of the rich, both in the outdoor and in the indoor departments, as well as in the summer Lakeside Home.

The isolation building (Figs. 137 and 138) of this group is planned particularly for the care of an epidemic and for small children. It is designed on the principle of the Pasteur Hospital in Paris, and will be described in detail in the chapter on contagious hospitals. It provides for absolute isolation of suspected cases, or contagious cases as they develop. A separate entrance, separate elevator, and a separate corps of nurses are provided for this section of the hospital.

This hospital carries on a very large out-patient clinic. (See plan Out Patient Department, Fig. 229). The original hospital has been remodeled, airing balconies and day rooms added, and the wards opened up and brought into the sunlight.

One department of this hospital which probably no other hospital of its size has is the complete plant for the pasteurization and modification of all milk not only for the hospital but for a very large out-patient distribution. This department has the most modern, up-to-date equipment.

Two or three examples of children's departments in general hospitals will illustrate some of the points suggested in the preceding paragraphs.

In a small hospital in *Melrose*, Mass. (Fig. 253), the children's department, although very small, is separated from the main corridor by two glazed doors. The ward (Fig. 144) is connected with a

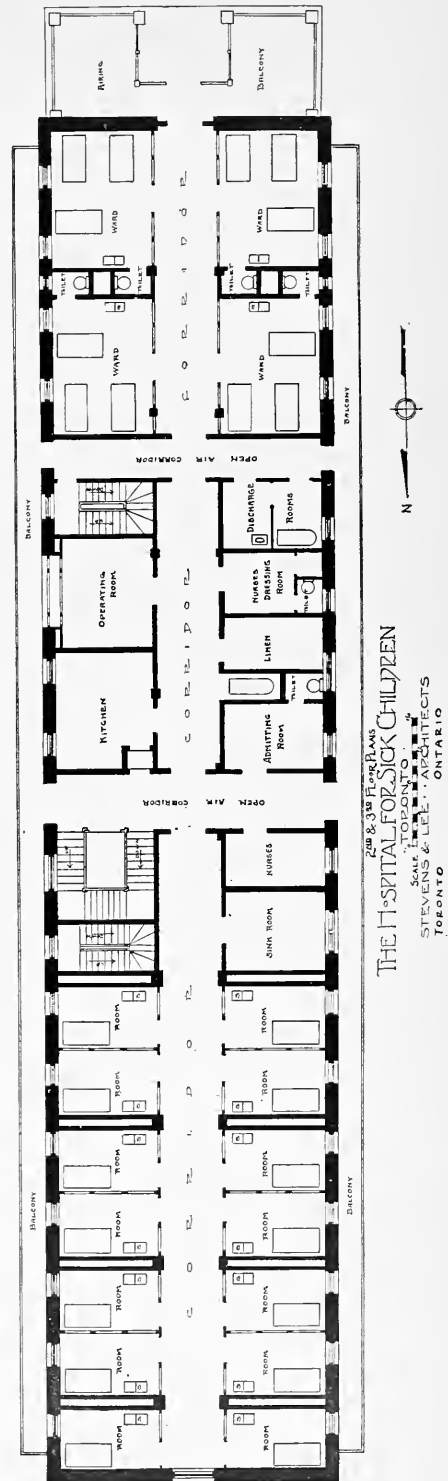


FIG. 137. ISOLATION PAVILION.

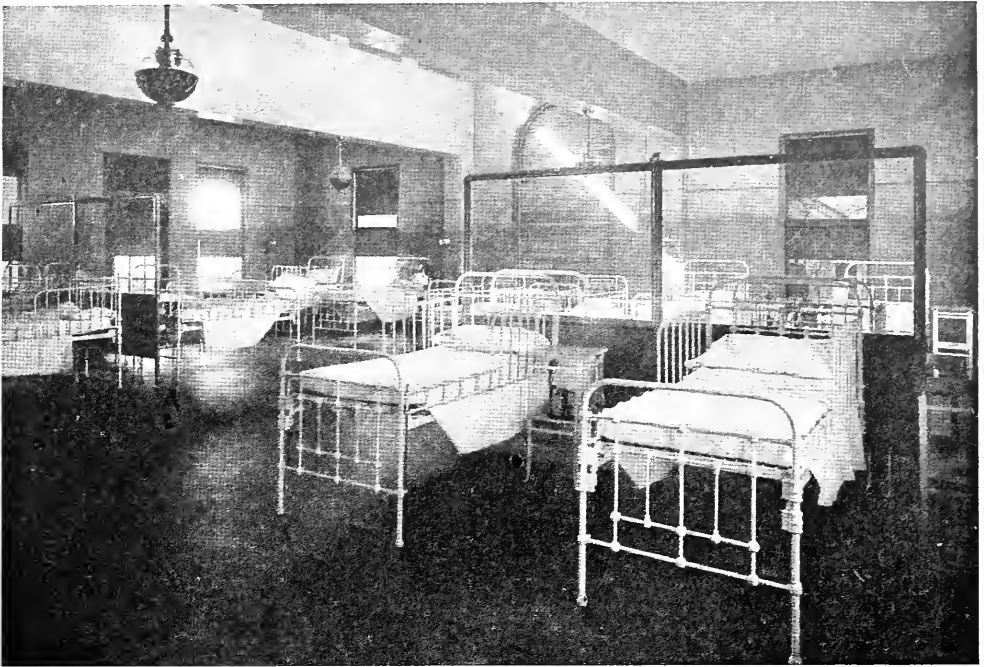


FIG. 139. CHILDREN'S WARD—MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

large outside airing balcony and is provided with special children's toilet, and a small isolation room with glazed walls for better observation is provided.

In the children's department of the *Bridgeport Hospital* (Fig. 139) eighteen children are cared for in the main ward. This ward is sub-divided by glazed screens into groups of four or five beds each, the glazed screens permitting perfect supervision. A small isolation room is provided for one or two more patients. A large, well-lighted day room (Fig. 140), ample airing balcony, and complete service rooms, including serving kitchen, sink room, surgical dressing room, bathing room, and toilets, are provided.

The simple decoration on the walls of the main children's ward, depicting mountain scenery, and a large memorial window add to the color effect of this department.

Adjoining the children's department is a small infectious department, consisting of two isolation rooms and an isolation toilet. This isolation department, while adjoining the children's department, can be entirely shut off and served from a

cross corridor connecting with the admitting department.

Another good example of a children's ward building is shown in the plans of the children's pavilion of the *Worcester City Hospital* (Fig. 145, 146). The wards, the private rooms, and the utilities are grouped around a central rotunda in such a way that surveillance is easily kept of every portion of the floor. Here the natural system of ventilation is used—i.e. ventilating the entire wards from the center of the ceiling, which slopes at an angle of at least thirty degrees. This construction is well hidden in the exterior treatment.

In the plans for the *Hospital for Ruptured and Crippled* (Figs. 141-143), New York City, a most comprehensive scheme is carried out. This service is largely for children and the planning is simple and straightforward as the outpatient section, consisting of thoroughly equipped rooms and departments, is entered on the left of the center while a corresponding entrance on the right enters the executive department.

In the basement are the kitchen, the

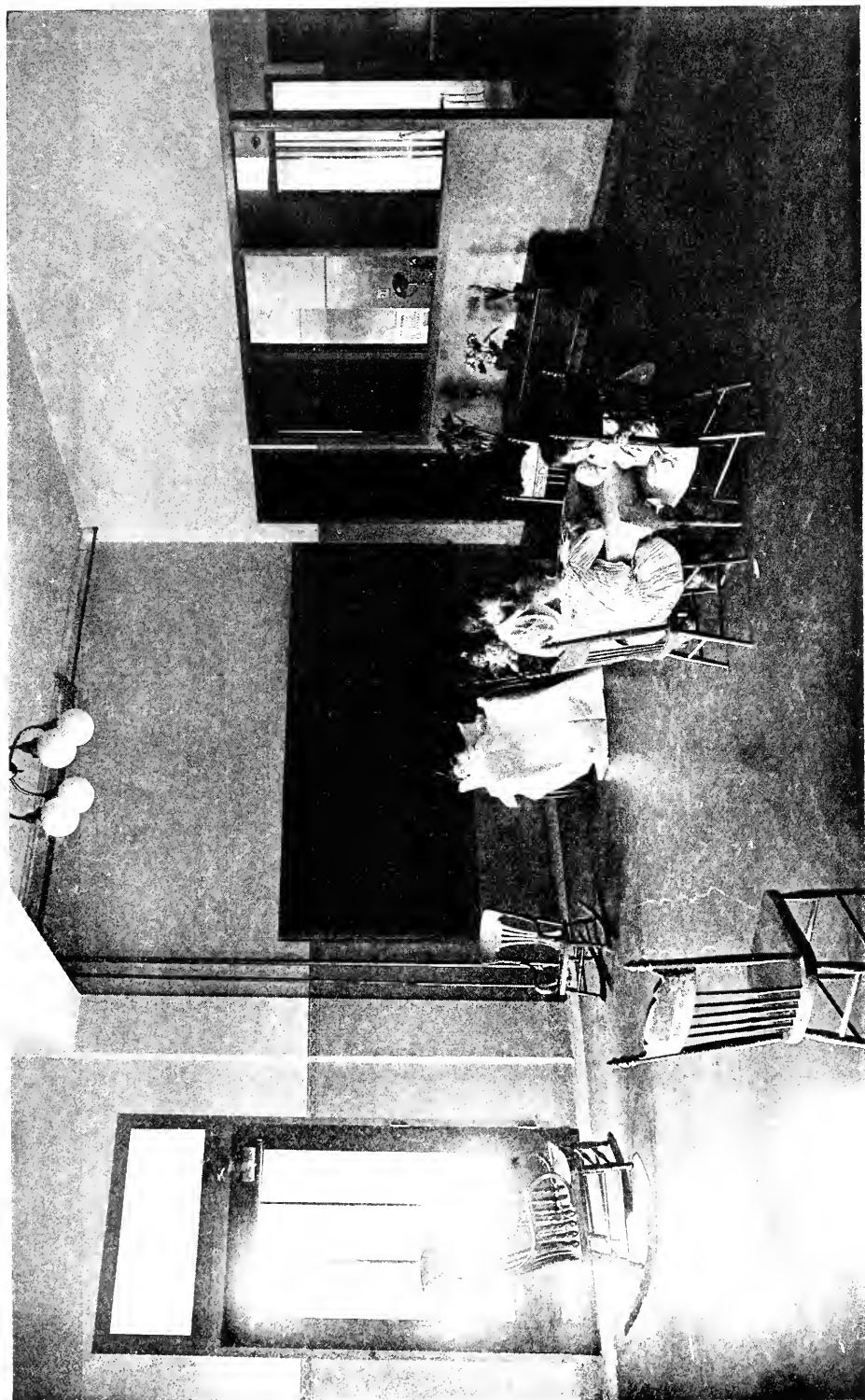


FIG. 140. DAY ROOM IN CHILDREN'S WARD—BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

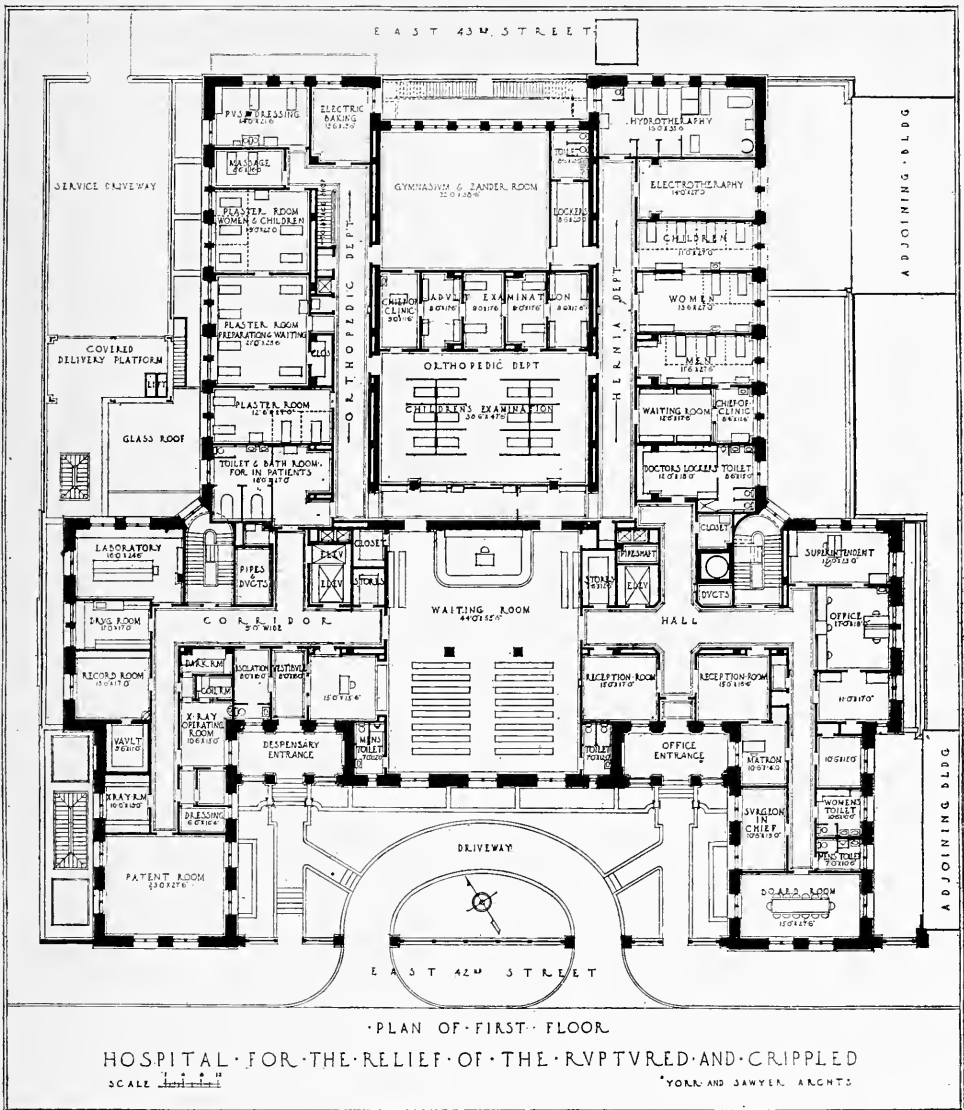


FIG. 141.

laundry, the heating plant, the brace shop, and storage for supplies.

On the first floor are the out-patient department and the administration department.

The second floor contains the living quarters for the superintendent, staff, housekeeper, and graduate nurses.

On the third floor are the wards for girls and female adults, together with dining-rooms for patients.

The fifth floor plan is similar, except that the operating department is here located.

The fifth floor contains the class and school rooms and the large assembly halls for the children, while on the sixth are the great out-of-door wards and solariums.

The color scheme throughout is most pleasing and is most artistically carried out.

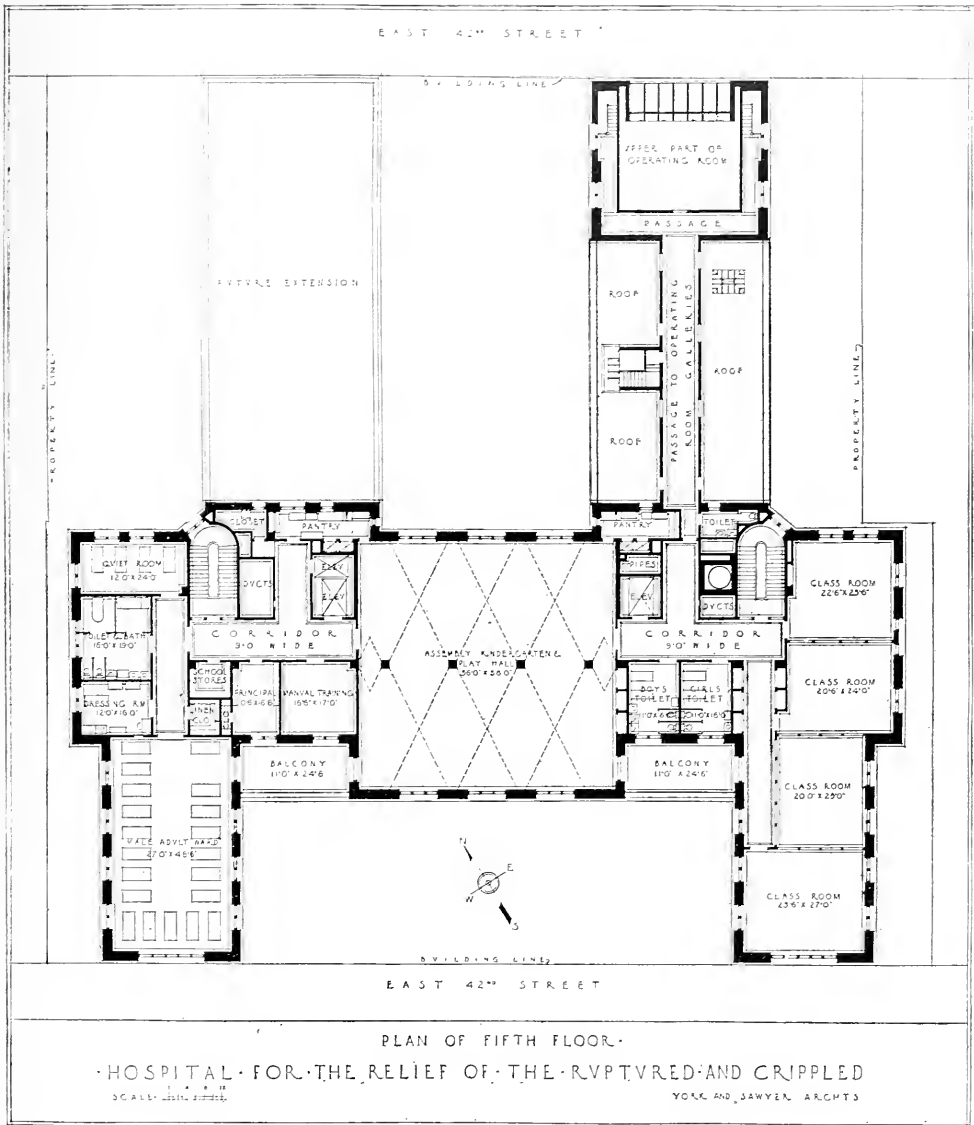


FIG. 143.

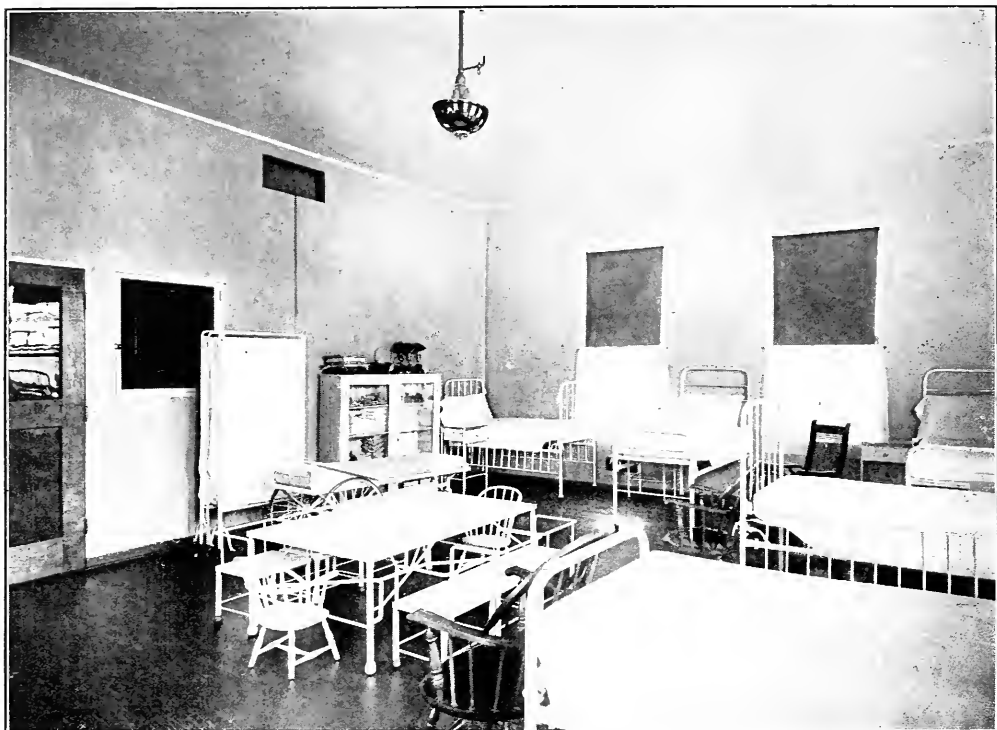


FIG. 144. MELROSE HOSPITAL. CHILDREN'S WARD.

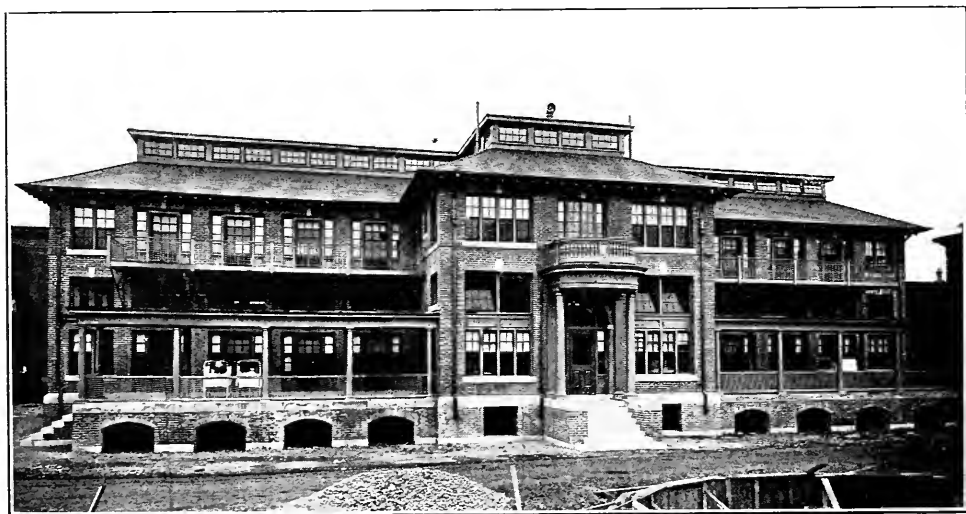


FIG. 146. WORCESTER CITY HOSPITAL, CHILDREN'S BUILDING. EXTERIOR.
Fuller & Delano, Architects.

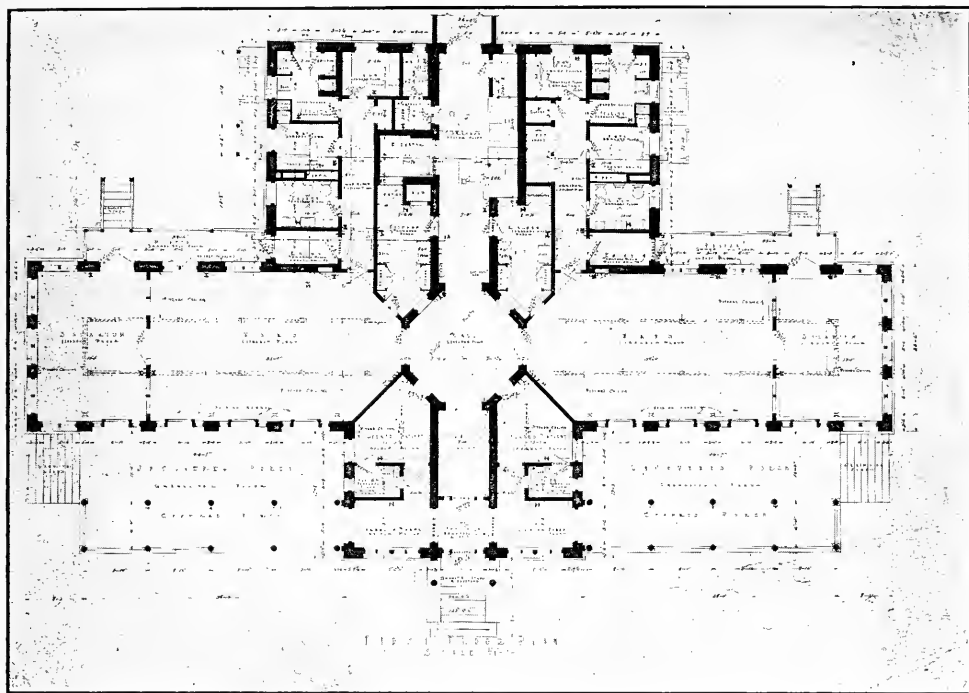


FIG. 145. WORCESTER CITY HOSPITAL, CHILDREN'S BUILDING. FLOOR PLAN.
Fuller & Delano, Architects.

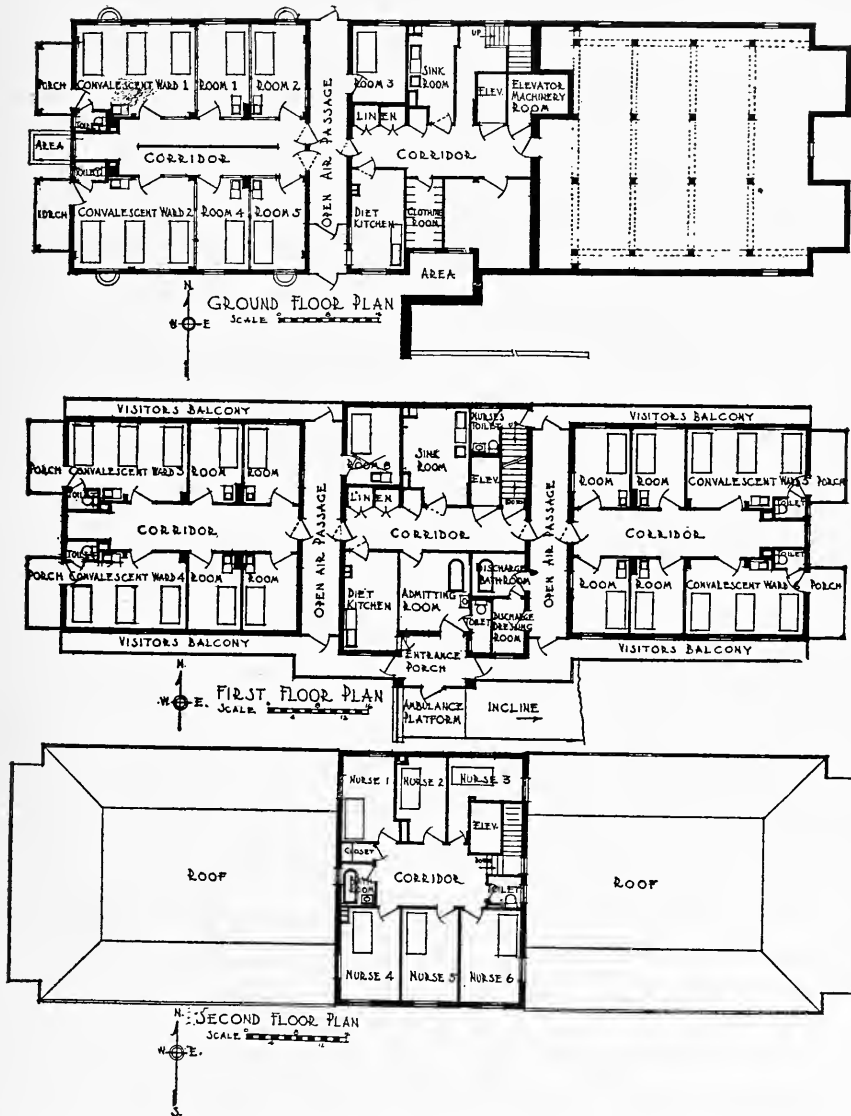


FIG. 151. FLOOR PLANS—WHITE ISOLATION BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect; Mellen C. Greeley, Associate Architect.

the nurse washes her hands thoroughly.

(d) All utensils are disinfected by boiling or otherwise.

This is Dr. Martin's description of the rooms:

"The partitions of the room are glazed to facilitate surveillance and to render isolation less irksome to the patient, for through the glass partitions the patient remains in contact with the world outside, which is a great comfort to him.

"The patient in his room ought to be sheltered from all cross infection, whether it be from the hospital or from outside. Everything which enters the room shall be sterile, or at least freed from all noxious germs. All that leaves his room must also be sterilized."

In other words, the laws of antiseptics and aseptic surgical technique must be observed.

On these principles many of our newer American hospitals for contagious diseases are now being built. The theory is that none, or comparatively few, of the communicable diseases is transmitted other than by contact, and the best authorities agree that true air-borne infection is very rare.

We should then plan our hospital for communicable diseases:

1st—So that the nurse or doctor, after contact with the patient, can have ample and immediate opportunity to scrub the hands.

2nd—So that sterilizers can be provided for sterilizing every article that goes to the patient or is taken from the patient.

3rd—So that provision can be made for the removal and destruction of waste, either by local incinerators or properly protected receptacles to convey to the general destroyer.

Then there must be the careful observance of strictly surgical technique—i.e., as in the surgical case the area around the open wound is clean, unless infected by contact with some unsterile instrument, or unclean hands, so the area around the infected patient is clean unless polluted by touch or contact from the patient or some one or something which the patient has touched.

Perhaps no man in this country has given more thought and study to this subject than has Dr. Chas. V. Chapin,* the Providence, R. I., Health Commissioner, ably assisted by Dr. D. L. Richardson, Superintendent of the Providence City Hospital. Here theory is supplemented by actual practice, with wonderfully satisfactory results.

In this hospital one will see in rooms adjoining one another, cases of scarlet fever, diphtheria, erysipelas, and measles, with the same physicians and the same nurses administering to all, the latter eating in the same dining-room, living in the same nurses' home with nurses of other departments of the hospital.

As the service becomes larger or the diagnosis of the cases surer, then the grouping of the various diseases in different buildings becomes an economy, but the technique is never relaxed.

One of the best planned isolation pavilions in this country is that recently built by the Department of Health of the City of New York at the *Willard Parker Hospital*, and used for a measles building (Fig. 156). Here on the ground floor one finds the best form of cubicle system. In addition to the special sink, lights, etc., each cubicle has a small well-ventilated toilet room entered from the room, containing a watercloset, making it unnecessary for the patient to leave the isolating room until he is convalescent or discharged.

The admitting pavilion (Fig. 157) of the *Kingston Avenue Hospital* of the Department of Health, City of New York, is well planned, providing for separate service and entrance from the outside, if necessary, to every room on the ground floor. This, too, has separate toilets for each cubicle or room.

The contagious department of the *St. Luke's Hospital*, Jacksonville, Florida, consists of separate pavilions for white and colored (See general plan, Fig. 7).

The plan is an adaptation of that of the *Pasteur Hospital* of Paris (Fig. 150) and does away with all the cumbersome and elaborate arrangements of the old school (Fig. 151). All classes of con-

*"Sources and Modes of Infection."



FIG. 152. VIEW OF WHITE ISOLATION BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect; Mellen C. Greeley, Associate Architect.

tagious diseases, with the exception of smallpox, which is still cared for at a distance from other people, largely on account of popular prejudice, are treated in one building. There are single rooms for fresh cases and wards for convalescents. The rooms are cubicles, with glass partitions for ease of observation, each cubicle being a separate entity, complete in itself. Correct technique, the so-called "aseptic nursing," prevents the spread of infection, but facilities must be provided for carrying it out.

The central portion of the building is the administrative department, being occupied by the admitting and discharge rooms and the various utilities, with the office of the nurse in charge. An open air cut-off separates this from the part occupied by patients.

Each room or ward is furnished with a scrub-up sink, with elbow faucets, so that after any service for the patient the physician and the nurse scrub and disinfect their hands before leaving the room.

They also wear gowns while caring for the patient, leaving them on hooks *inside* the door before they depart.

The equipment consists of utensil sterilizers, which can be opened by the foot; elbow handles for the faucets over slop sinks; dish sterilizers large enough to take a tray and its dishes; garbage incinerators which may be opened by elbow; liquid soap dispensers with pedal action; lever door handles which can be opened by elbow or upper arm; and everywhere scrub-up sinks with elbow handles. By means of these carefully worked out details the nurse is enabled to care for a patient, dispose of all waste material, and accomplish the disinfection of all utensils and appliances used in the process, without touching anything else. At the close of each procedure she sterilizes her hands and removes her infected gown, becoming clean again, to start upon the same round with another patient.

When a patient is admitted, he is

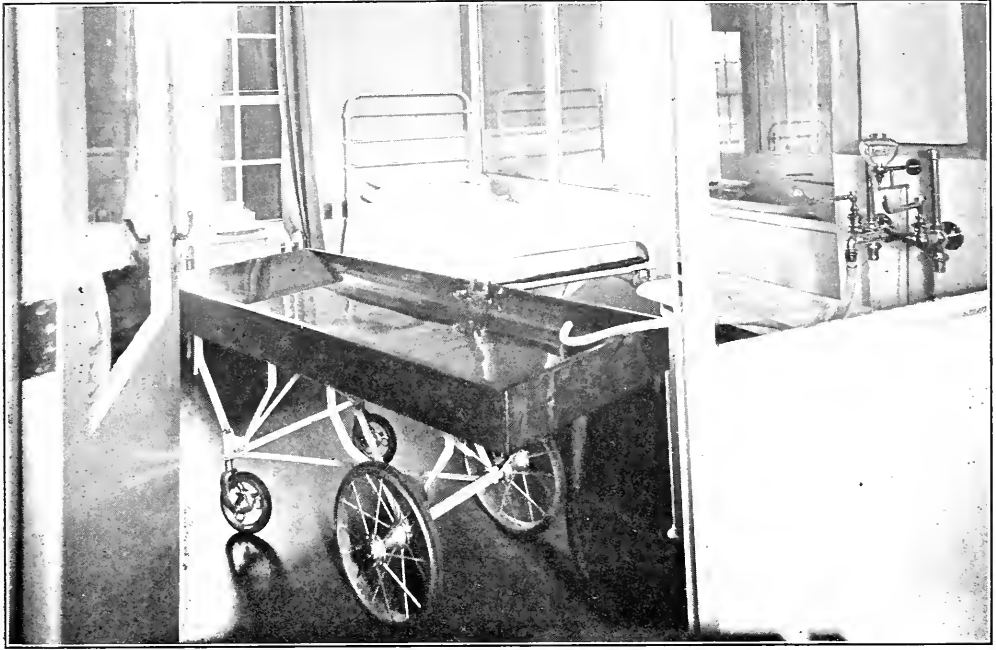


FIG. 153. ST. LUKE'S HOSPITAL, JACKSONVILLE. ISOLATION BUILDING.
VIEW IN SINGLE ROOM.

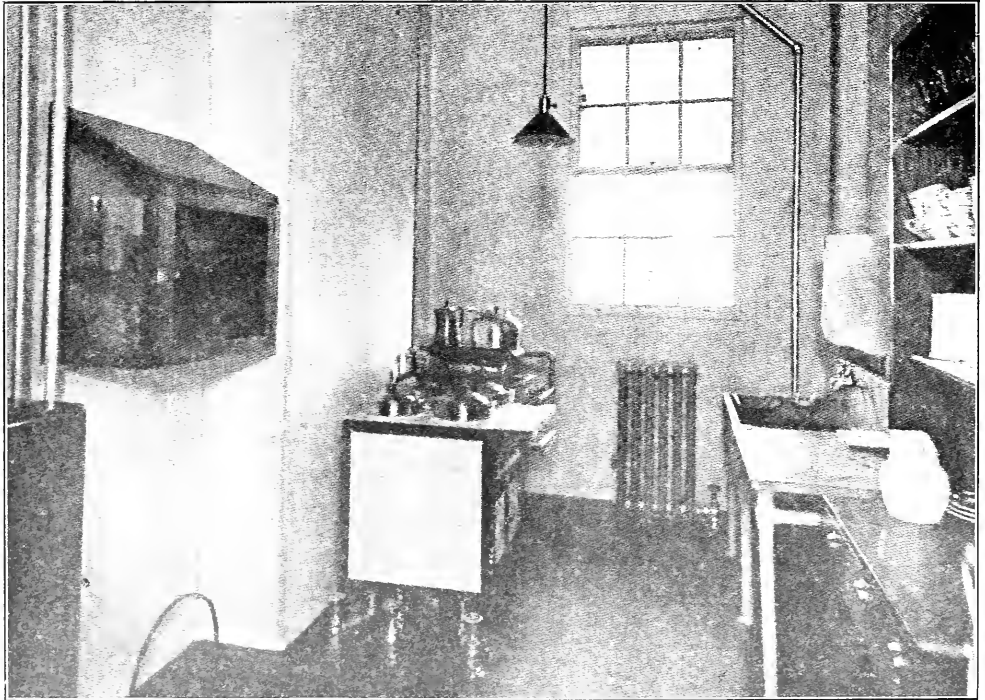


FIG. 154. ST. LUKE'S HOSPITAL, JACKSONVILLE. ISOLATION DEPARTMENT.
VIEW IN SERVING KITCHEN.

bathed on the shallow tub-slab with a spray, so he gets what is practically a shower bath or shampoo in running water. He is then placed in a single room. When convalescent, he is transferred to the small ward where there may be other patients recovering from the same disease. This ward is treated as a unit, but the aseptic technique is still carried out.

A portable tub (Fig. 153), similar in principle to the one in the admitting room but made of wood covered with copper for lightness, set on a wheeled stretcher frame of the same height as the beds, is also provided. This may be taken to any room, the patient transferred to it, and bathed with a spray attached to the faucet at the scrub-up sink. A floor drain in each room receives the waste water from the tub. The tub is disinfected after each using.

When the patient has recovered and

is to be discharged, he is taken through the open air corridor to the discharge room, given a cleansing and disinfecting bath, and passed into the dressing room, where he receives his own uninfected clothing. From this room he departs without coming into contact with other persons or parts of the buildings. (See also Figs. 153 and 154.)

Hospital finish of the simplest and strictest sort has been carried out in these pavilions and everything made so as to be easily cleaned. The furniture is extremely simple, the rooms having no more than a bed, a comfortable chair, and a table, besides the all-important sink or lavatory. These sinks were made special, being provided with an integral drain-board upon which to place hand brushes and other appliances.

The convalescent wards have toilets directly off them, and each has its own screened-in porch.

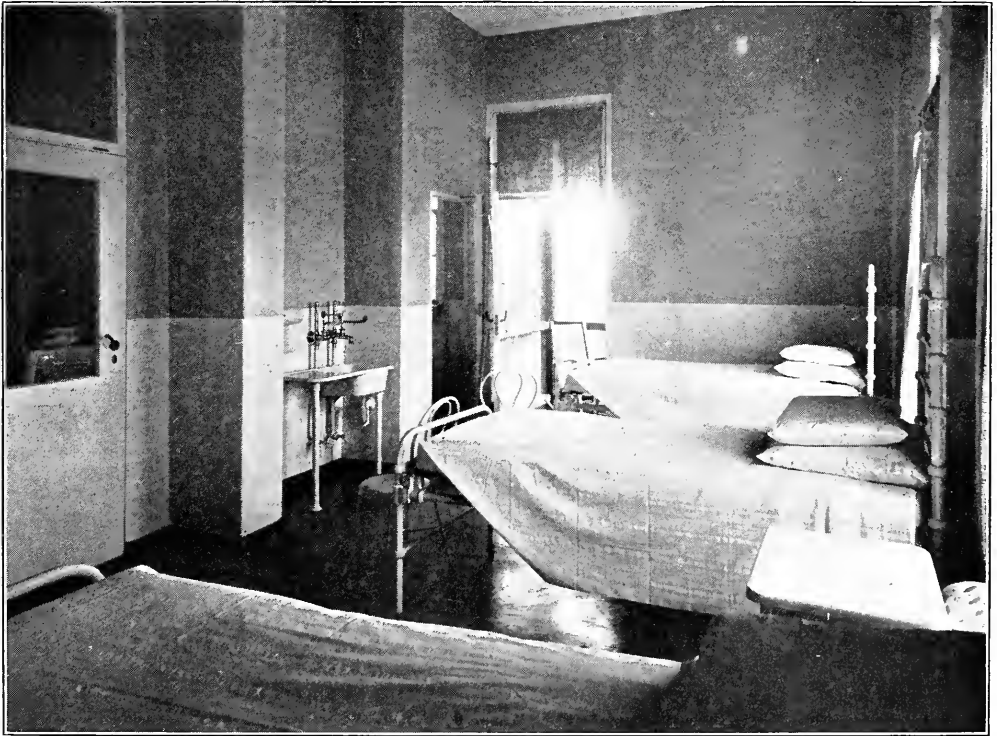


FIG. 155. ST. LUKE'S HOSPITAL, JACKSONVILLE. ISOLATION DEPARTMENT. THREE-BED WARD.

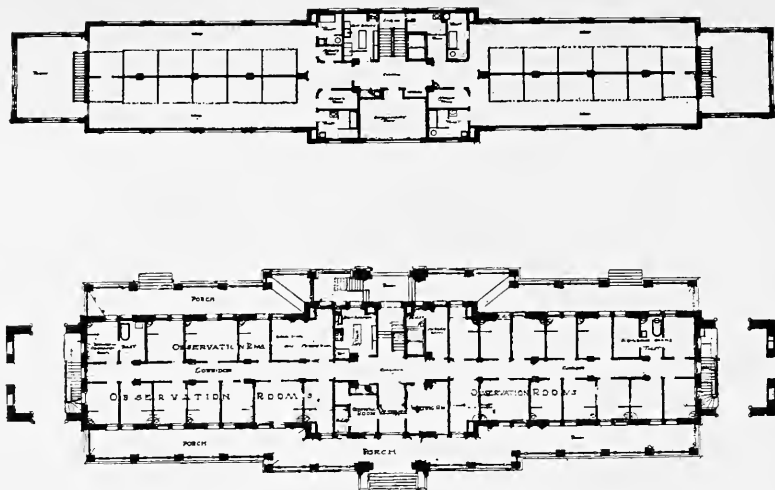


FIG. 156. WILLARD PARKER HOSPITAL, NEW YORK. MEASLES PAVILION.

All floors are of cement, painted. Washable rugs are provided for the rooms of the convalescents.

Visitors are not allowed in the building, but there is a narrow balcony running in front of every room, like the Pasteur, so that parents and friends may come to the patient's window, see and

talk with him, and know how he is getting on. This one provision probably does as much as any one thing to establish confidence in a contagious hospital.

Though there is considered to be no adequate reason why the nurses caring for contagious cases may not mingle with other nurses, it has been deemed wisest,

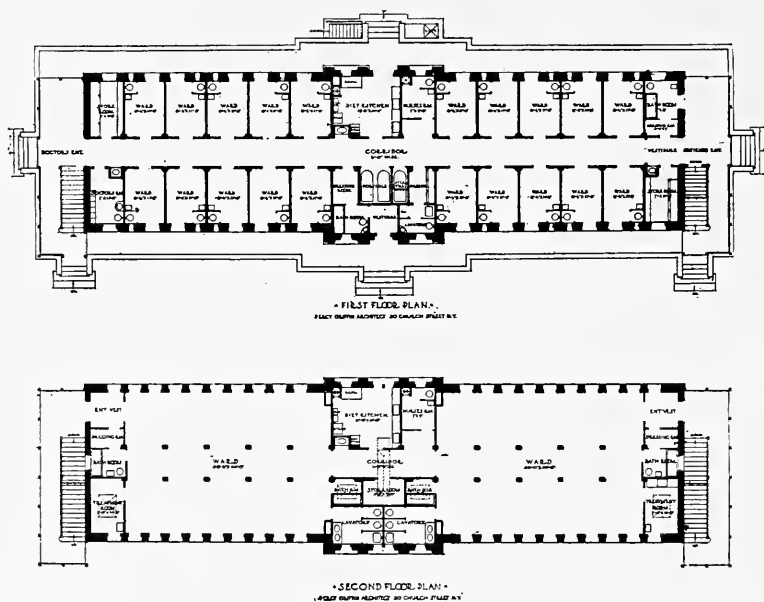


FIG. 157. KINGSTON AVENUE HOSPITAL, BROOKLYN. ISOLATION PAVILION.

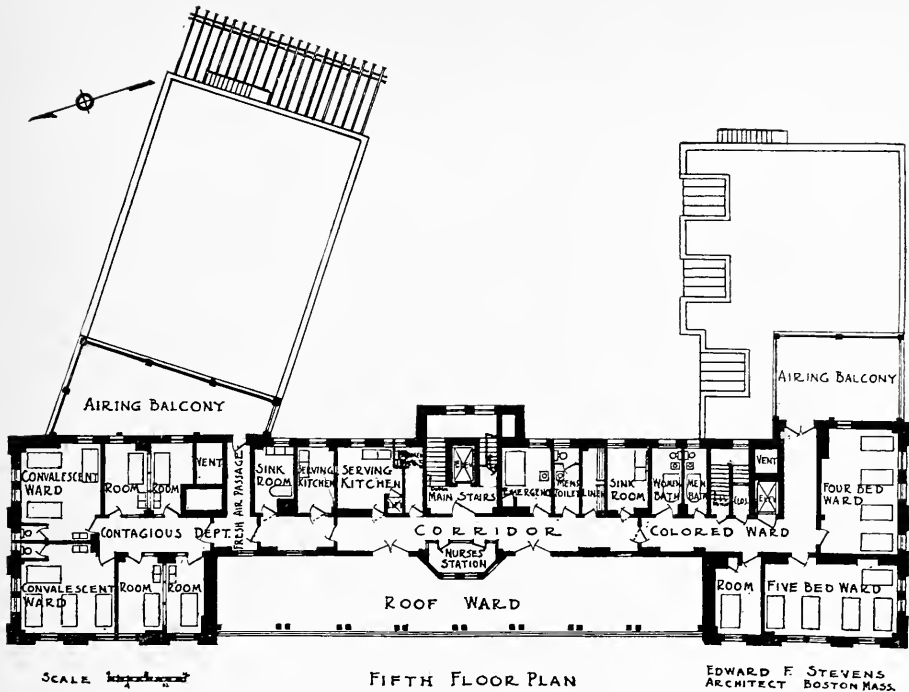


FIG. 158. PLAN OF FIFTH FLOOR, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

at the present time, to house them in the isolation pavilion. The second floor, therefore, provides single rooms for six nurses, with bath, etc., these rooms being fully as commodious as those at the nurses' residence. This floor has a separate entrance, through one of the open air corridors.

The pavilion provided for white persons has rooms for patients on two floors, one accommodating twenty and one eleven patients. Only the first floor is used at the present time, the ground floor being finished but without equipment until such time as it may be needed.

The pavilion provided for colored persons accommodates eleven patients. It is an exact counterpart of the administration portion and one wing of the white pavilion.

If the theory of isolation and the technique of care is correct, then infectious diseases can be safely cared for in the general hospital. This is now being car-

ried out in the *Ohio Valley General Hospital*. While this department (Fig. 158) is in the main building, it is nevertheless isolated by a fresh air cut-off from the other rooms on this floor. Separate serving kitchen and sink room are provided as well as every facility for cleansing the person of the patient, for the work of the nurse, and all utilities. The nurse, after thoroughly cleansing her hands and changing the department gown, mingles freely with the other nurses of the hospital.

The isolation unit (Figs. 137, 138, 160) of the *Hospital for Sick Children*, Toronto, Canada, has been developed on the Pasteur principle, or much like the Isolation Department of St. Luke's Hospital at Jacksonville, with air cut-offs between the acute, the service, and the convalescent departments. Each cubicle is provided with the sink described in the Jacksonville Isolation. Food is delivered in the open corridor through a window to the serving kitchen. Under this win-

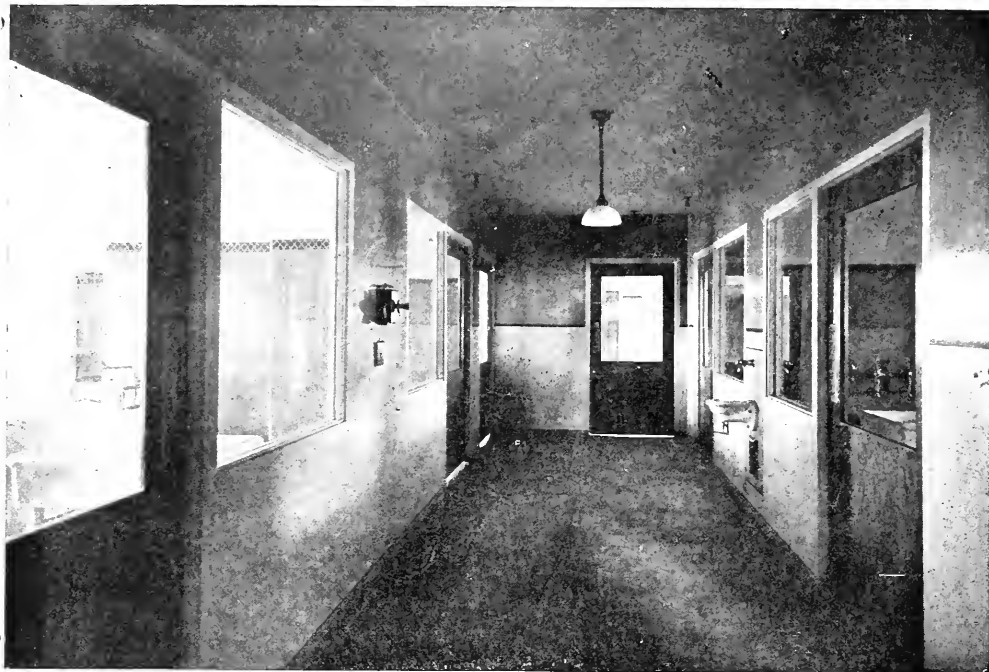


FIG. 159. ISOLATION DEPARTMENT CORRIDOR—OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.

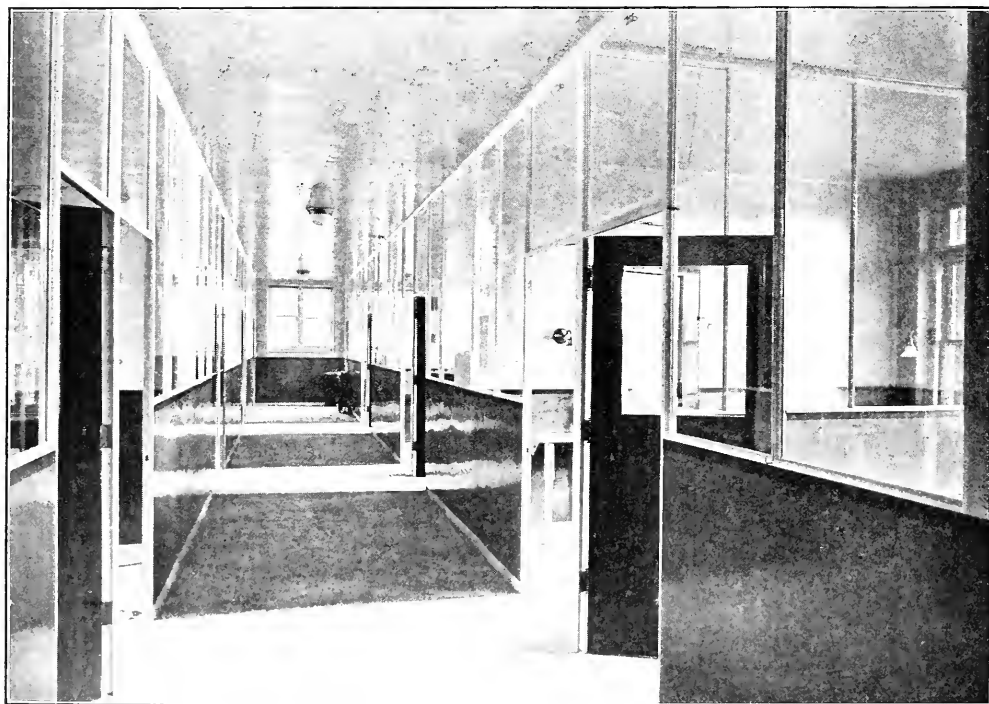


FIG. 160. HOSPITAL FOR SICK CHILDREN, ISOLATION BUILDING. VIEW OF INTERIOR.

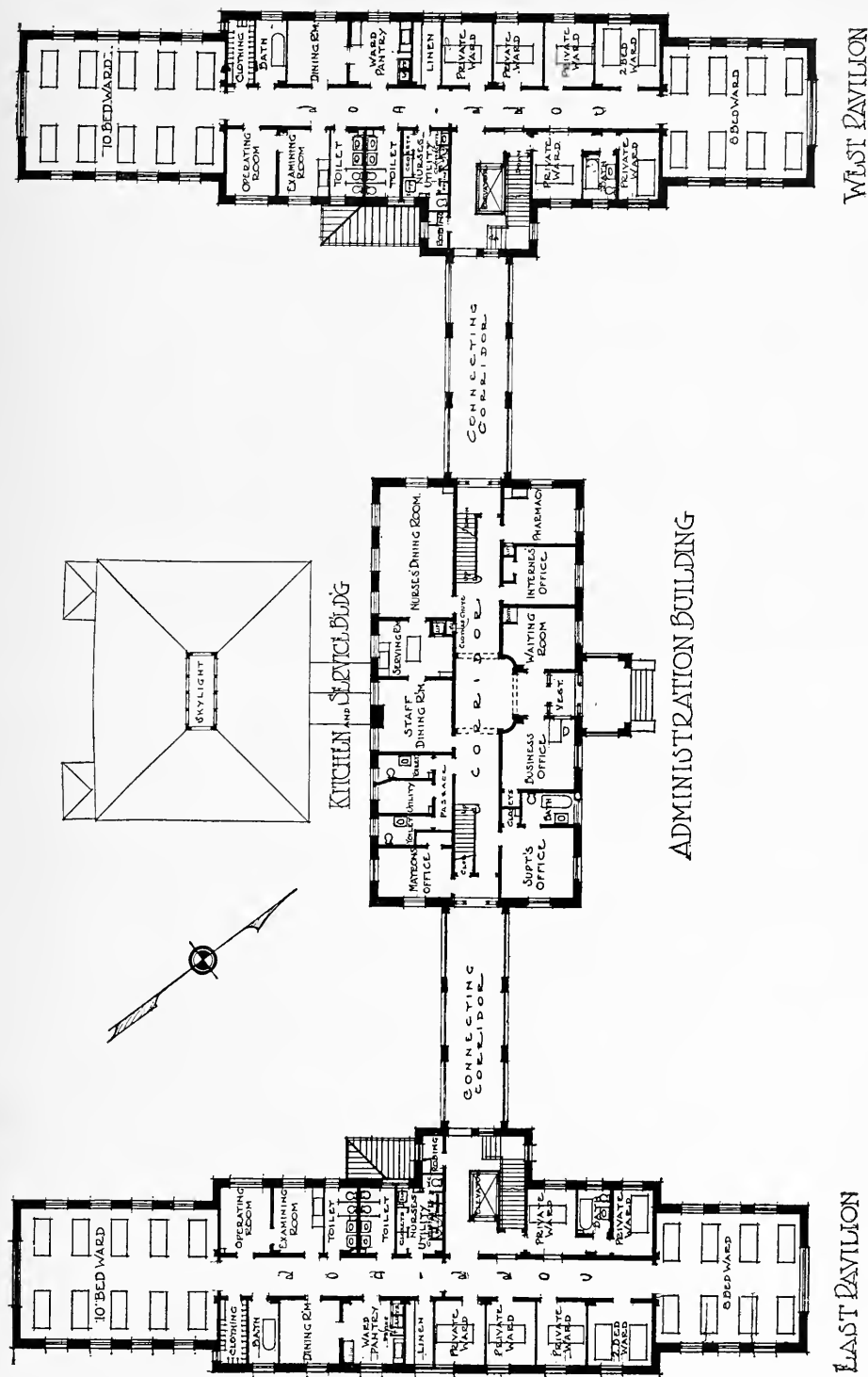


FIG. 163. FIRST FLOOR PLAN—MASSACHUSETTS HOMEOPATHETIC HOSPITAL, JOHN C. HAYNES MEMORIAL, BRIGHTON, MASS.
Kendall, Taylor & Stevens, Architects.

dow is the dish sterilizer, the cover of which is controlled from either side of the wall.

Small operating rooms are provided in each story. A separate staircase is also provided for the discharged patients, leading from the discharge room or cross corridor.

The contagious department of the *Massachusetts Homeopathic Hospital* at Brighton (Fig. 163) provides for all classes of contagious diseases. The plan consists of a three building unit, connected by open corridors. The general administration building is in the center, flanked by the ward units.

CHAPTER IX.

The Psychopathic Department of the General Hospital

Since the beginning of this century, no greater development has been made in any branch of hospital housing and treatment than in the psychopathic and neurological departments.

Only a few years ago the person who was adjudged insane was committed to an asylum; and if resistance were offered he was placed in irons and half starved. The mild cases were herded with the violent—yes, “herded” is a good name for it—and they were treated more as beasts of the field than as human beings whose course of thought was diverted through some slight lesion. The scientific study of the disturbed patient has shown that in most cases the modern or humane treatment is productive of the greatest success; and psychopathic hospitals, either as independent institutions or as departments of a general hospital, are being considered everywhere. The psychopathic hospital then becomes a clearing-house for the study and segregation of cases.

In this department more than in any other in the hospital it is essential to consider the environment of the patient; the interior must be restful; there must be nothing in color or design to excite the patient; the surroundings must be homelike, with as little of the institutional appearance as possible. Great care should be used, however, to avoid giving any opportunity for the patient to inflict personal injury, by providing non-projecting hardware; turned-down door handles; flush transom bars; lighting fixtures out of reach, with no projections; small lights of plate glass in windows, which never open enough to admit the body of a person; special plumbing fixtures, firmly secured; and cabinets for telephones and service built into and not projecting from the wall.

One of the earliest institutions to recognize the more scientific care of the

mild cases was the “*Psychiatrische Klinik*” at Munich. The treatment is humane. No force is used with the patients. If they are inclined to be unruly, they are persuaded to enter the continuous bath; if they offer resistance, a mild hypodermic is given, and when they recover from this the continuous bath keeps them quiet. So the bath has become a great factor in the maintenance of peace and quiet in what was once called the “mad house.”

In this “Klinik” (Figs. 170 and 171) one hundred and fifty patients are cared for, divided into first, second, and third classes, according to the service and accommodation. Every class is provided with special visiting-day rooms wherein patients may receive their friends.

Those in the first class have private rooms. For this accommodation, with services of nurse and doctor, they pay eleven marks (\$2.75) per day. Every attempt is made to make the apartments homelike, and no visible form of restraint is noticed.

The second class patients have less luxurious accommodations but have comfortable living rooms and sleeping quarters, for which they pay six and one-half marks (\$1.63) per day.

The third class patients occupy wards at three marks (\$.75) per day. The wards are neat and well kept, and toilets are provided in every ward unit.

The details of construction are most carefully worked out. The door frames are of iron, with no projection; all door handles are turned down, affording no way to cause injury; all cabinets are of steel, placed flush with the wall; the telephones are enclosed in cabinets, and signal is given by a red light, no bells being used. In the new *Psychiatric Clinic* of the State University of Utrecht, Holland (Figs. 172-176), Professor Heilbronner has worked out some excellent ideas.

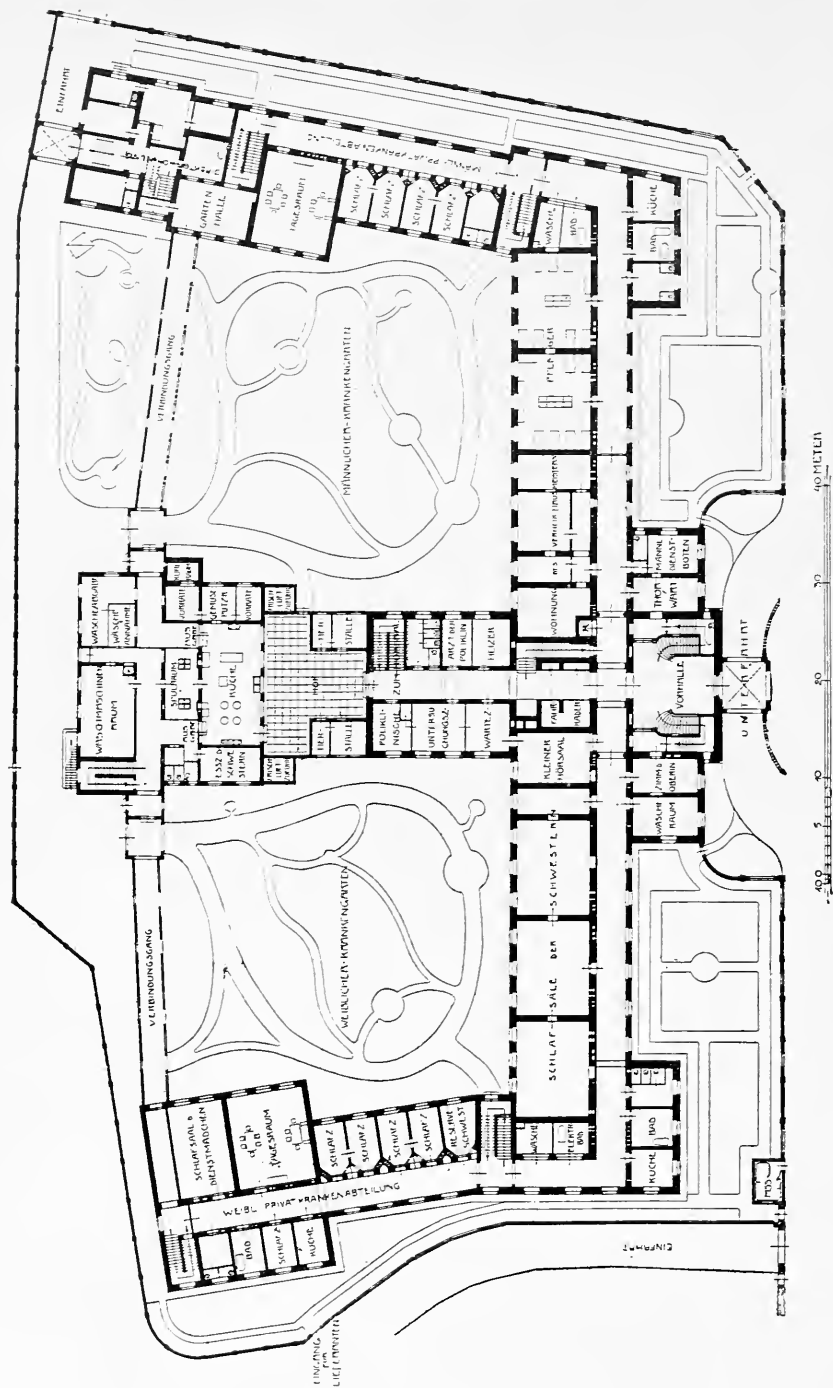


FIG. 170. PSYCHIATRISCHE KLINIK, MUNICH. GROUND FLOOR.

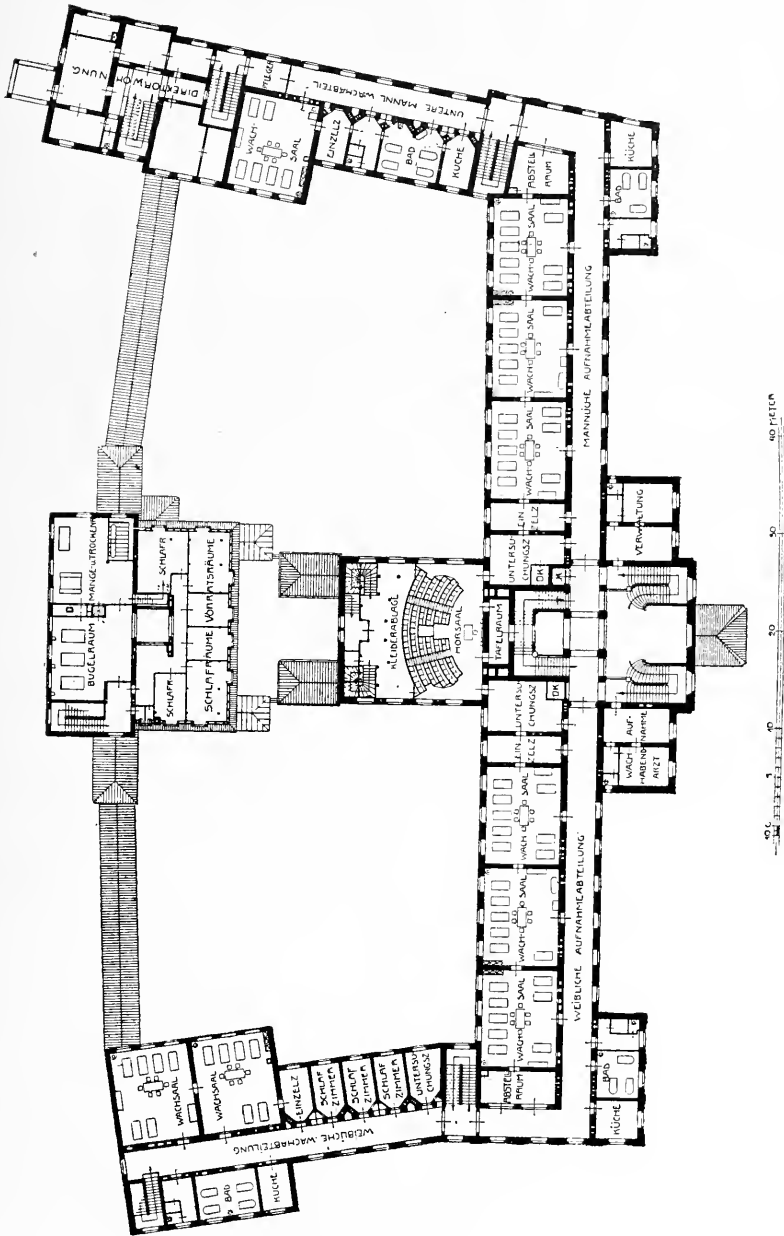


FIG. 171. PSYCHIATRISCHE KLINIK, MUNICH. FIRST FLOOR.

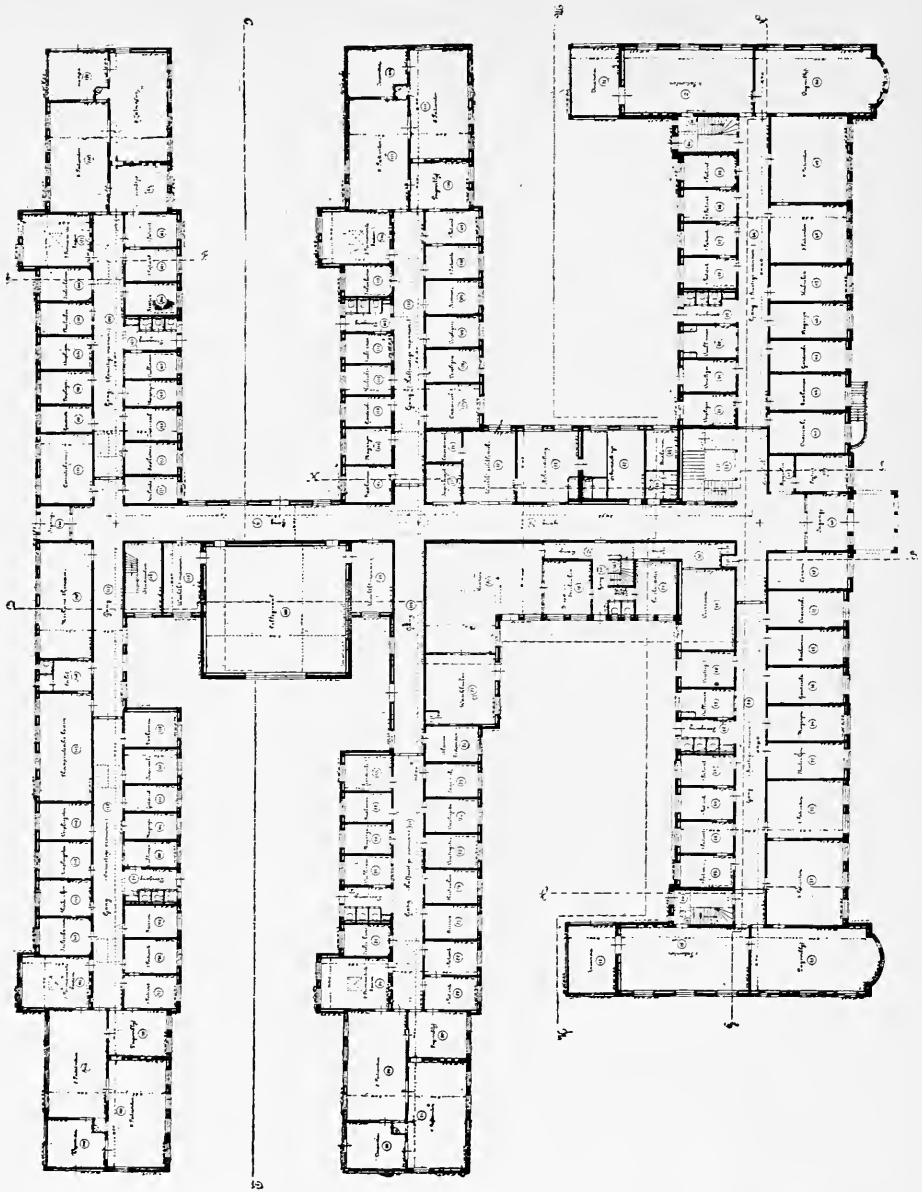


FIG. 172. PSYCHIATRISCH-NEUROLOGISCHE KLINIK, UTRECHT. GROUND FLOOR.

One hundred patients are accommodated and all are placed on the first floor, which is divided into six sections—three for women and three for men—and classified according to condition.

The offices, laboratories, etc., are located on the second and third floors of the main building.

While this is strictly a pavilion type of

hospital, all sections are connected by a common corridor, adjoining which is the working or domestic side of the institution, the kitchens, dining-room, together with lecture rooms, etc. Each one of the patients' sections is supplied with the necessary utensils and equipment; each has an examining room, so arranged with curtains that it can be changed into

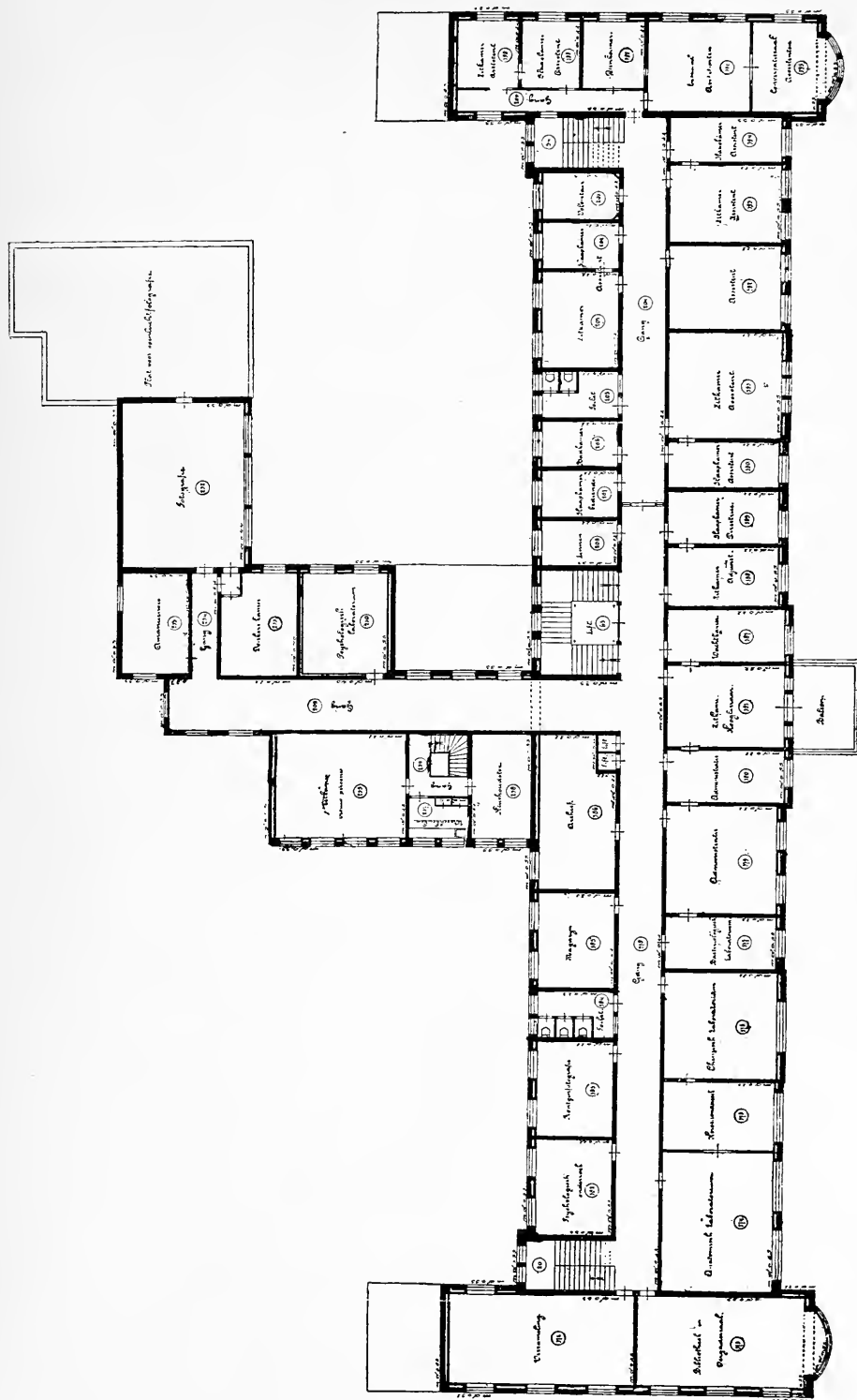


FIG. 173. PSYCHIATRISCH-NEUROLOGISCHE KLINIK, UTRECHT, SECOND FLOOR.

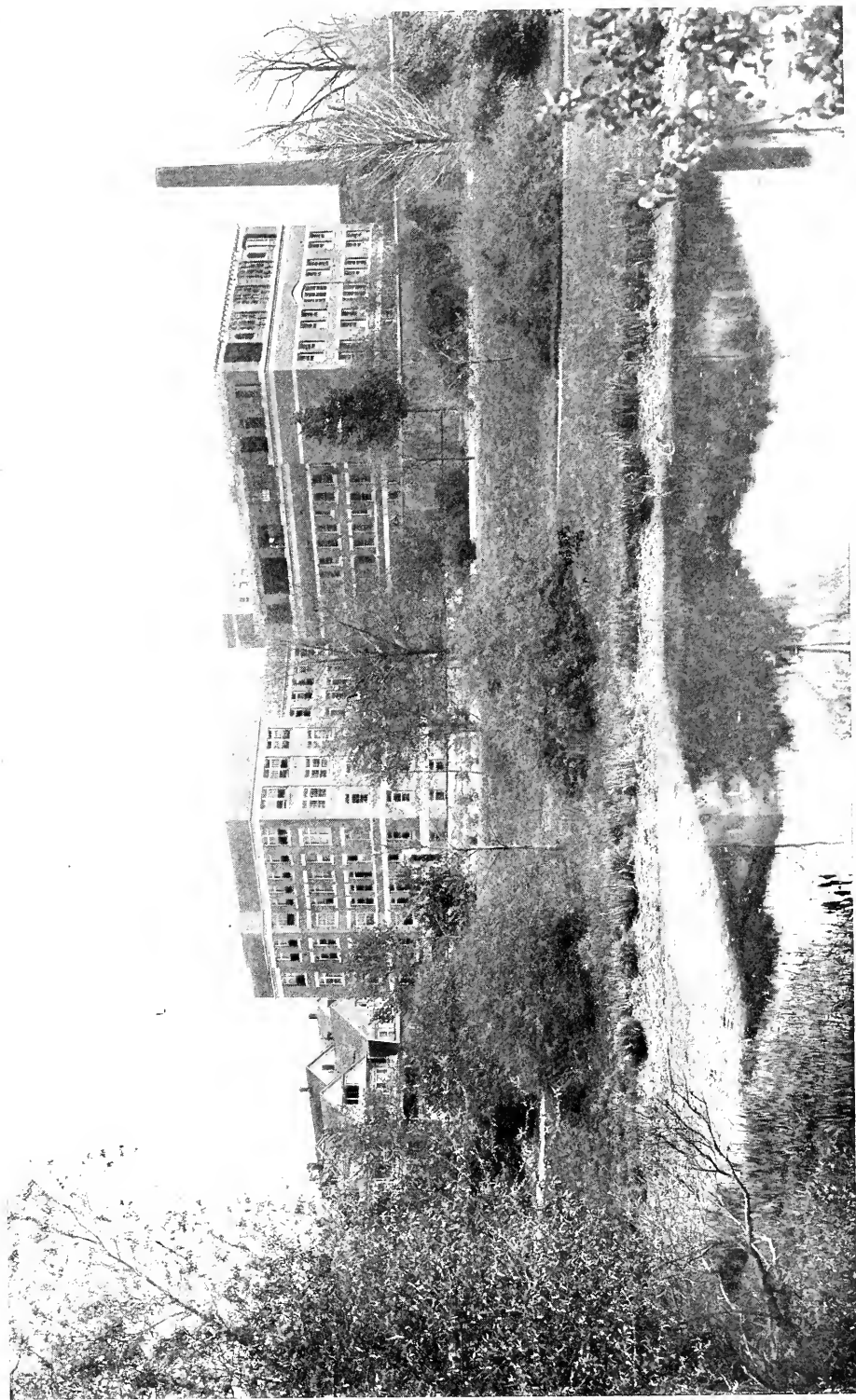


FIG. 177. VIEW FROM THE FENS-PSYCHOPATHIC HOSPITAL, BOSTON.
Kendall, Taylor & Co., Architects.

There are no large wards in any section, six beds at most.

In the neurological section, where less surveillance is needed, the rooms are separated by single doors; while in the psychiatric sections the wards are divided by large sliding doors, making it easier for the night watch.

In the psychiatric sections, three baths to every thirteen beds are provided. The control for these baths is behind locked cabinet doors, and if the temperature of the water varies beyond certain limits an electric alarm summons an attendant.

In each psychiatric section is provided an isolation room with rounded corners, fastened-down toilet, protected lights, and protected double doors with an observation window. The windows are made of swinging sash, divided by heavy reinforced sash and glazed with heavy plate glass. The floors are covered with linoleum.

The administration offices, the laboratories, and the sleeping quarters for the attendants are on the second and third stories.

A large photographic gallery is ar-

ranged for cinematography, and has special lights arranged for night photography.

These two examples will show something of the development of the psychopathic hospital in Europe; but there every large hospital has its own psychopathic department, large or small, as the needs and development dictate.

In this country the *Massachusetts Psychopathic Hospital*, in Boston, was one of the first clinics of the kind.

In 1911 the State of Massachusetts appropriated the sum of six hundred thousand dollars, to be expended in the building of a new psychopathic hospital in the City of Boston. The site selected was in what has come to be known as the "hospital district" of Boston, located in close proximity to the Harvard Medical School, the Peter Bent Brigham Hospital, the Infants', the Children's, the Good Samaritan, the New England Deaconess, the Robert Brigham, the Channing, the Huntington and other hospitals.

The work was intrusted to Henry H. Kendall, architect, under the direction of

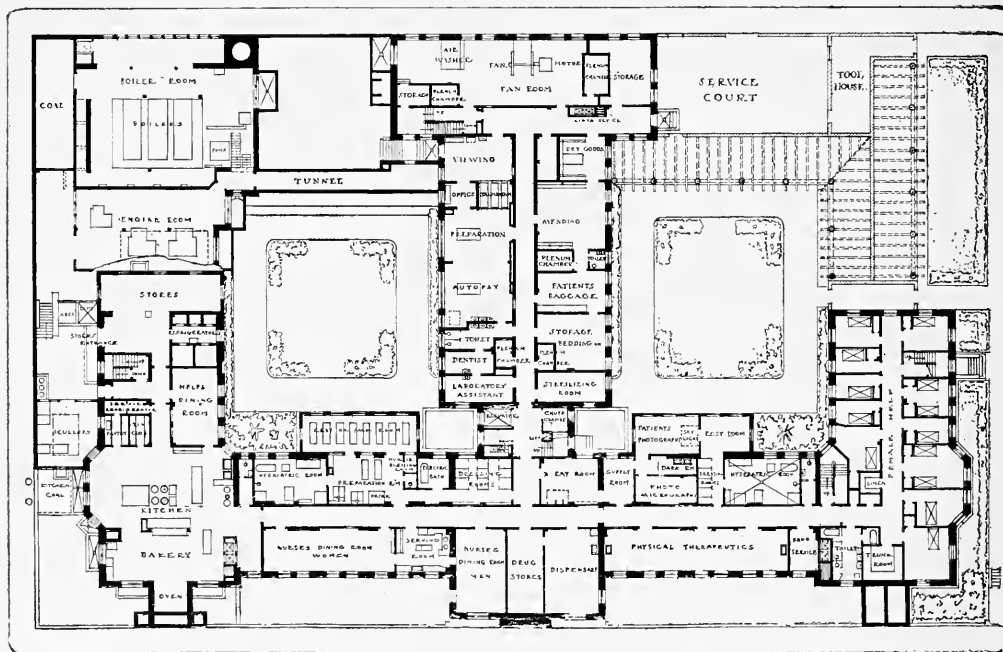
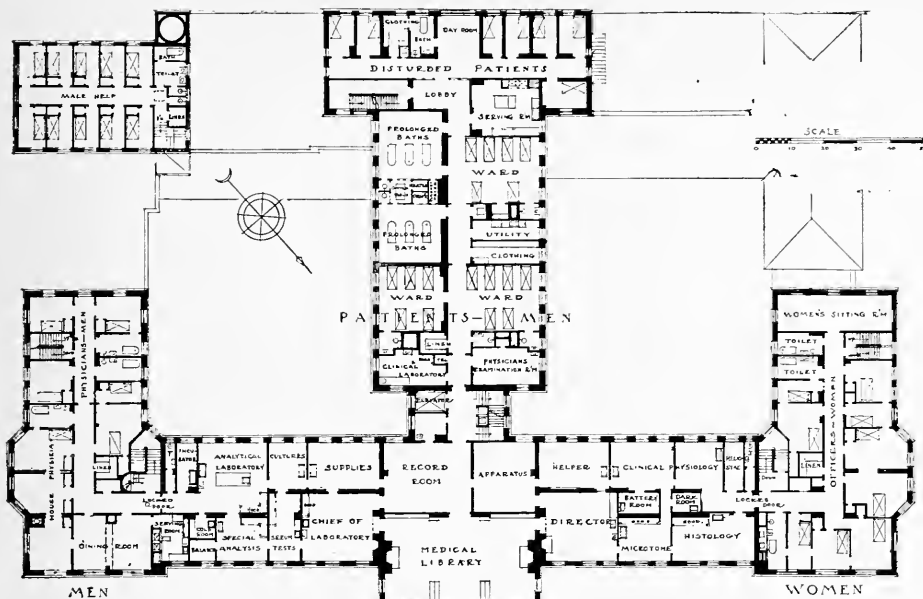
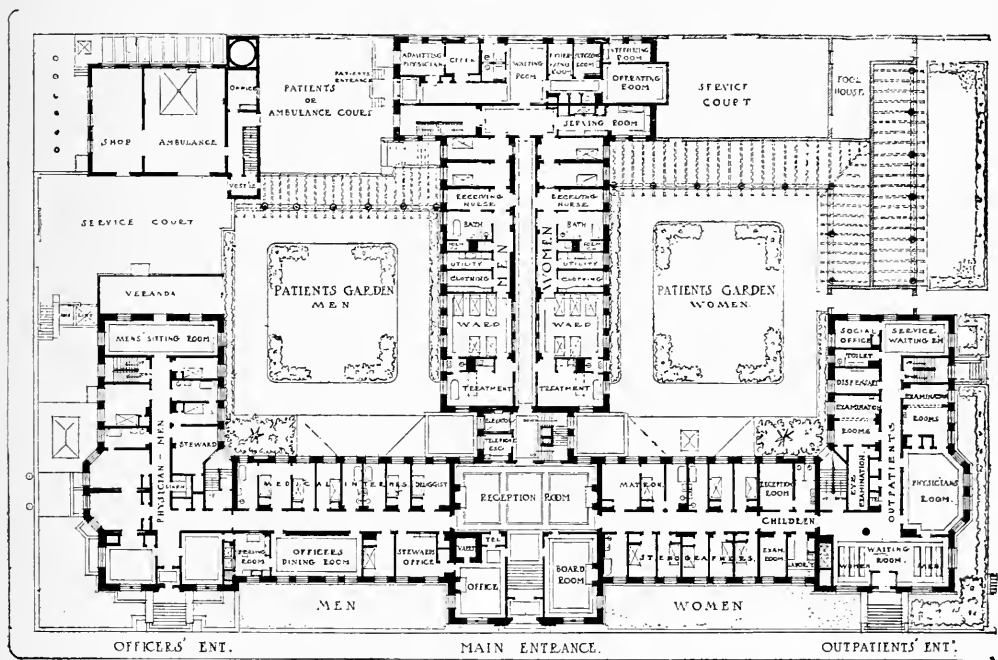


FIG. 178. BASEMENT PLAN—PSYCHOPATHIC HOSPITAL, BOSTON.
Kendall, Taylor & Co., Architects.



SECOND FLOOR PLAN

FIG. 180.



FIRST FLOOR PLAN

FIG. 179.

PSYCHOPATHIC HOSPITAL, BOSTON.
Kendall, Taylor & Co., Architects.

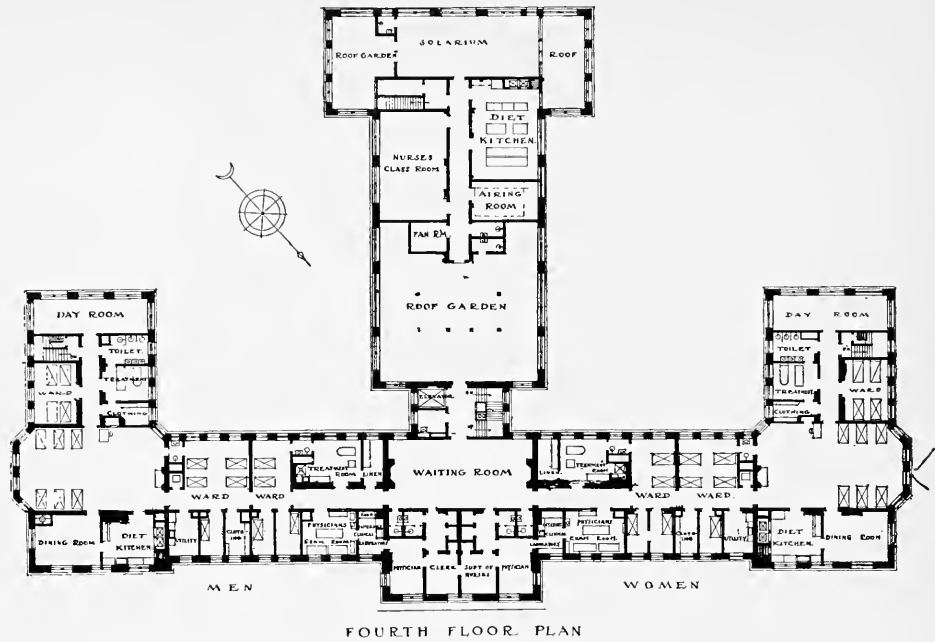


FIG. 182.

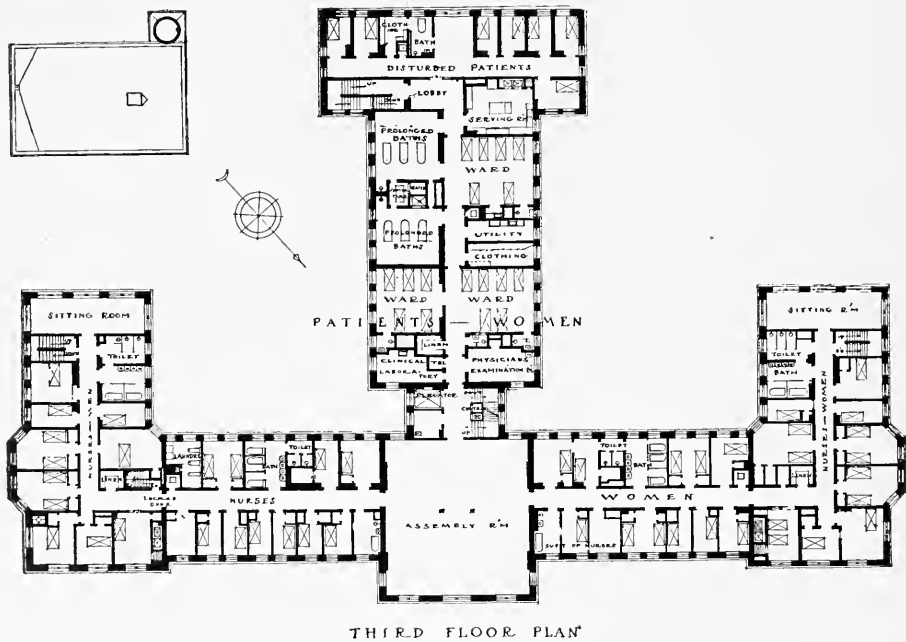


FIG. 181.

PSYCHOPATHIC HOSPITAL, BOSTON.
Kendall, Taylor & Co., Architects.

Dr. Owen Copp, executive officer of the State Board of Insanity.

The development of this institution in Massachusetts has given the State a magnificent psychopathic building which forms the clearing-house, as it were, for the larger insane institutions throughout the state.

The building is E-shaped, a plan giving the greatest number of rooms exposed to the best light and air. It is four stories in height and will accommodate one hundred and ten patients. The patients are generally admitted at the ambulance entrance on the first floor, leading from the side street.

On the first floor (Fig. 179) there are two admitting units, one for each sex, divided by a general corridor. These units consist of two admitting wards of five beds each, general treatment rooms, baths, isolation rooms, etc. Connected with this section are the operating and emergency department and the offices for the admitting officers. The remainder of the first floor is occupied by offices and quarters of administration, matron, and staff, and the general receiving department, containing waiting-room, examining rooms, rooms for social service workers, etc.

What might be termed the patients' building is separated from the main building by a short connecting corridor containing the elevator and staircase. The wards for the men are placed on the second floor and those for the women on the third floor (Fig. 181). Each has a section for disturbed cases, divided into separate rooms for each patient.

As in the foreign hospitals previously described, the continuous bath is used largely in the treatments.

Each ward unit has its own serving kitchen, and bath and toilet unit.

A large out-door day-room on the roof (Fig. 182) affords opportunity for exercise and recreation, and as this institution overlooks the splendid park system of the city the patients have much outside of themselves to occupy their minds.

The *Phipps Clinic*, a well-studied psychopathic department of the Johns Hopkins Hospital, shows much care and thought, not only in the planning but in the æsthetic side of hospital architecture. The restricted area made it necessary for the architect to carry the building five stories above the basement in order to provide for the needs of the department. For description, the writer is indebted to Adolph Meyer, M. D.*

There is an out-patients' department, with waiting room, which also is used in part for occupation classes, social workers, and examining rooms.

In the hospital division there is an admission ward, with provision for excited cases, as well as a semi-quiet ward, a quiet ward, and a private quiet ward. A number of well-arranged, exclusively private suites and rooms are provided.

The administrative portion is principally on the north, consisting of offices for administration, laboratory and staff quarters.

The medical treatment department consists of hydrotherapy and mechanotherapy.

The top floor is reserved for the large recreation hall and roof gardens, charmingly designed and colored.

The ward unit consists of an eight-bed ward.

*"The Modern Hospital," Vol. I, No. 2.

CHAPTER X.

Tuberculosis Department

The care of patients afflicted with pulmonary tuberculosis demands special study for the problem is totally different, from almost every point of view, from that of the treatment of the general patient, whether surgical, medical, or contagious, in the number of gradations of patients and the different care required for each grade.

If we are to plan for the care of tuberculosis patients on the grounds of the general hospital, then a portion of the site should be selected remote from the other patients' buildings, but with equal regard to sunlight and protection from the cold winds. If, as is more likely to be the case, the tuberculosis hospital or sanatorium is to be isolated and an institution by itself, and a site is selected remote from water, sewerage, and other municipal service, then the problems are increased many fold, and the natural contour, the nature of the land, and the meteorological conditions must be carefully studied.

If planning for "all comers," it will be necessary to plan on about fifty per cent of the patients being of the ambulatory class, who are able to be up and about and to do light work. Plans must be made for ground room for exercise and recreation, buildings for light industrial work, buildings for dining and entertainment rooms, facilities in other wards for carrying on the various activities of life under hygienic and supervised conditions, the main aim being to have the maximum amount of sunshine, fresh air, and absolute ventilation.

The area of land must not be restricted and it should have level stretches about the buildings. The outlook and general environment are almost as important as sunlight and ventilation—e.g., an otherwise beautiful site might lose much of the therapeutic value if a cemetery were in the immediate foreground, or if sit-

uated near noisy manufacturing plants or of smoking chimneys.

The average incipient patient soon wearies of his enforced confinement; and unless the natural attractions are considered he becomes discontented and leaves, so that the sanatorium may be without patients.

In providing service for tuberculosis cases they may be roughly divided into three general groups:

1st—Those in the last stages, in many instances dying patients;

2nd—The ambulatory cases, with incipient or even moderately advanced cases, incapable of regular work yet enjoying a reasonable degree of health;

3rd—The out-patient who, while needing treatment through the day, may return to his home at night under proper supervision.

For the treatment of the first class, wards or private rooms not unlike other medical wards or private rooms should be provided.

Proper care must be exercised for the protection of the nurse and the prevention of the spread of disease.

For the comfort of the patients the wards should not be too large; if subdivided by permanent screens they may become less depressing. Everything possible should be done to brighten the ward, and there should be provided a wealth of sunshine and plenty of out-of-door balconies.

As the death rate in these wards will naturally be greater than in any other part of the institution, the method of removing the body from the building so as to attract the least attention should be studied. If the morgue can be at some little distance from the wards, with an underground connection, much mental suffering will be avoided.

For the ambulatory case the problem

is very different. Here there are patients with the disease in an incipient or mildly advanced stage, who are up and dressed, and active to a certain degree, but for whom there must be provided proper sleeping quarters, with due regard to the out-of-door treatment recommended for this class. There must also be dressing and bath rooms which can be warmed in cold weather, recreation rooms for stormy weather, recreation parks for pleasant weather, and light employment for certain hours. Every ambulatory patient should have a cupboard, locker, or closet, which will be large enough to be entered and to contain his personal belongings. This cupboard should be well lighted, well ventilated, and well heated; for to the lonely man away from family and friends this may be the only place which he may call his very own. Such a cupboard should not be less than three by four feet in size, and should contain a seat, shelves, mirror, and any other conveniences which experience may dictate.

The toilets should be of sufficient size to accommodate the patients of the particular unit which they serve, and should be reasonably near the sleeping quarters.

The general room or day room should be light and cheerful, as it is the living-room of the family or the unit which it serves.

The sleeping quarters can be in wards, with beds on either side, with plenty of windows to open, or of the "tent" or "shack" form, open toward the south, with beds to the north. The modification of the shack has become perhaps the most popular form for the housing of incipients, for with this type the bed of the patient can be brought practically into the open when desired. The south can be closed with swinging sash or cloth screens, or can be left entirely open.

Nearly every tuberculosis hospital or sanatorium has its out-patient clinic, where the patient spends the day on the sunny lawn or broad terraces, receiving nourishing food and good advice for home living. For this work the principal equipment is steamer chairs, blankets, serving kitchens, and intelligent attendants. This educational and helpful

work, followed up as it is by the social service work of the institutions, is accomplishing important results in the stamping out of the great white plague.

In the large city and county institutions the industrial work of the institution can be done largely by the patients, with a tailor shop for the mending of patients' clothing, a harness shop for all leather work, carpenter shop for the necessary repairing, sewing rooms for repairing the linen and the making up of new material. Light employment during certain hours can be made a profit to the institution and a help to the patient. Waiting on tables and the light janitor

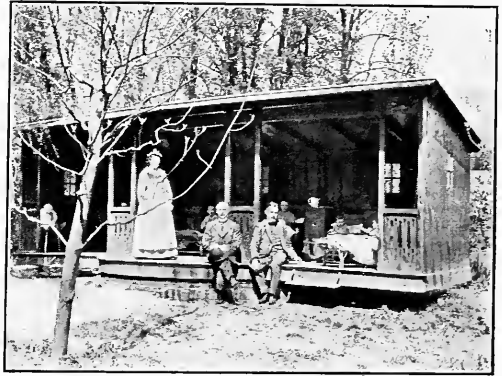


FIG. 190. REVOLVING AIRING BALCONY, AMSTERDAM HOSPITAL.

work about the building can all be done by the patients.

For the ambulatory class, dining-rooms must be provided, general assembly rooms for religious and secular services, recreation rooms, reading rooms, store and post-office, as well as general examining rooms, dental rooms, barber shops, etc.

An operating department should be provided, for the presence of tubercular germs does not prevent appendicitis or other troubles.

One item peculiar to the care of tuberculosis is the provision for the destruction of sputum cups, gauze and dressings which have come in contact with the patient. This can be a separate building where the patient can deliver his sputum cup and receive a fresh one, and where there is a suitable incinerator for

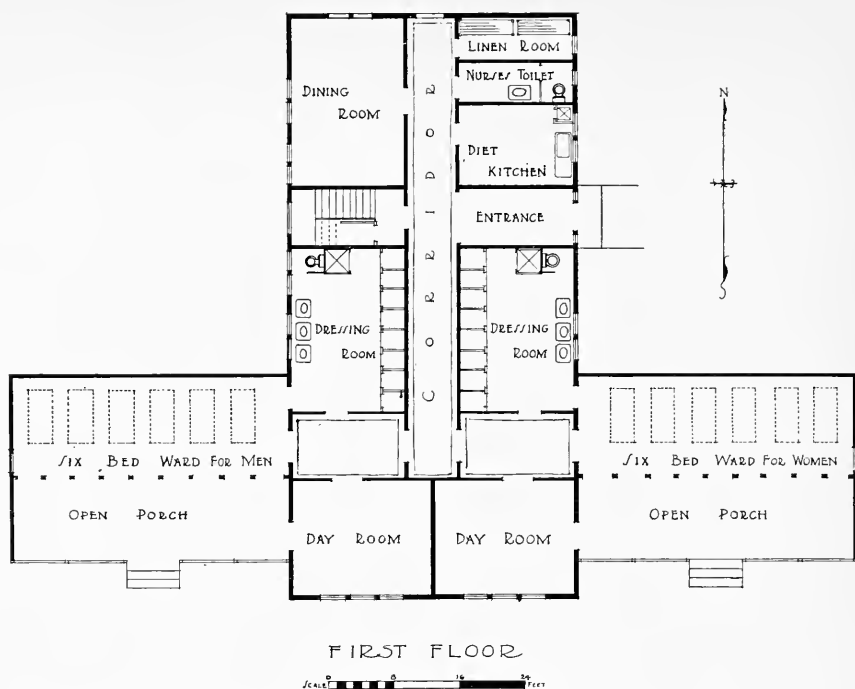


FIG. 191. CITY OF JACKSONVILLE PROPOSED TUBERCULOSIS UNIT.

the absolute destruction of all waste material.

Open air day shacks or shelters can be provided through the grounds at little extra expense. There are numerous patterns and they may even be made revolving, like the one photographed by the writer in Amsterdam (Fig. 190), where the pavilion could be moved to shield the patient from sun or wind.

Of the many good examples of tuberculosis hospitals and sanatoriums, few will be here shown, as this subject has been so carefully taken up by Dr. Thomas S. Carrington in his work on "Tuberculosis Hospital and Sanatorium Construction,"* to whom the writer is indebted for many helpful suggestions in his own practice.

A simple solution of the tuberculosis ward for the general hospital which was designed for the Health Board of the City of Jacksonville, is here shown (Figs. 191, 192). This unit provides for a limited

number of both chronic and incipient cases, the administration, food, and laundry being taken care of in another building. This unit is a part of the contagious department under the charge of the city.

The City of New York, through its Department of Health, has established at Otisville, at an altitude of from eleven hundred to twelve hundred feet in the Shawangunk Mountains, a most complete sanatorium for the care of tuberculosis.

Various types of construction and units were built from a single bed tent house to the more pretentious fireproof building; but in practically every building the sleeping is out-of-doors. Dressing-rooms and day-room are provided, which are heated certain hours in the day.

The Department of Charities also provides in its hospital work for the care of tuberculosis, both in the general hospitals on Blackwells Island and in the *Sea View Hospital* on Staten Island. In the latter institution (Fig. 193) which, with the additions now being built, will provide for two thousand patients, the earlier group

*Published by National Association for the Study and Prevention of Tuberculosis, 105 E. 22nd St., New York.

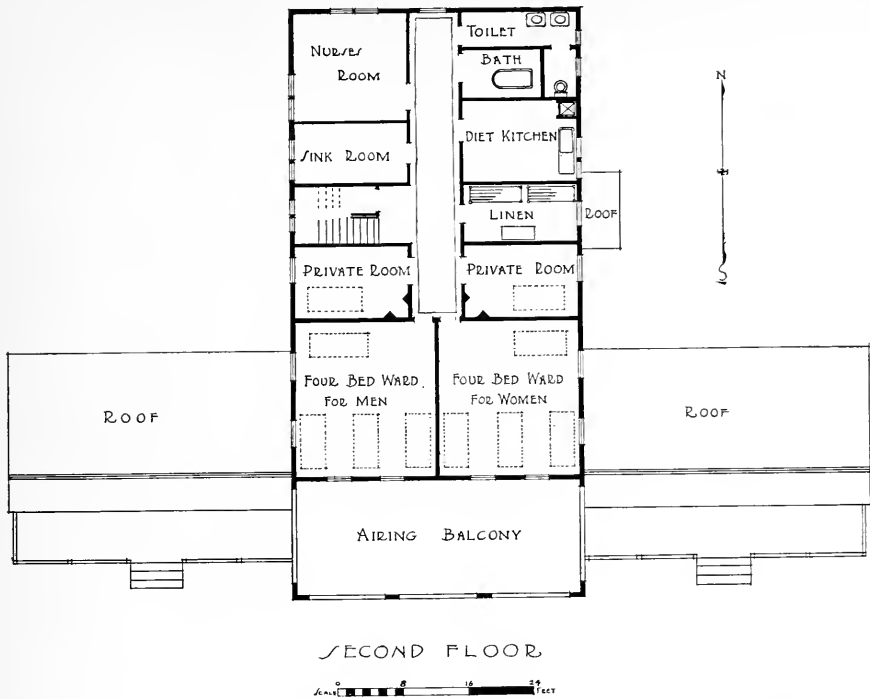


FIG. 192. CITY OF JACKSONVILLE PROPOSED TUBERCULOSIS UNIT.

occupied in 1914 will be used to house the chronic or bed patients. The ambulatory patients will occupy the twenty-one new pavilions. The institution will then be well balanced, accommodating an equal number of bed and ambulatory cases. The new out-door pavilions are being built in two groups, the one at the southwest to accommodate six hundred men, with "group" or executive building, and the other at the northeast to accommodate four hundred women. Dining facilities for the men will be afforded by the new dining hall placed on the main axis of the original group, and served by the main kitchen. This building (Fig. 194) also is used for an entertainment and assembly hall for patients of both sexes. The women will be served in the present dining building.

While the administration of the entire group will be from the main administration building, the "group" building in the center of the male section will contain the offices of the medical examiner and matron. There are examining rooms, pharmacy and treatment rooms, baths

for men, store, barber shop, dental treatment room, recreation rooms and library, as well as work rooms for various industries, and a linen room where all linen for the group will be given out.

The pavilion buildings, twenty-one in number, are to be practically identical (Figs. 198, 199). They are two stories in height, of fireproof material, divided into four sleeping apartments of twelve beds each, with each unit of two beds separated from the others by a dividing screen six feet high, but open on end and underneath to permit air circulation. These are not heated and are open to the south, with possible closing by the use of cloth screens on frames hinged at the top.

For each two wards a day room is provided, connecting directly with the toilet section, beyond which is the locker room. Each patient is provided with a locker three by four feet, with short door and screened ceiling, allowing free circulation of air but preventing interference from outside.

Two of the units used at the *Boston*

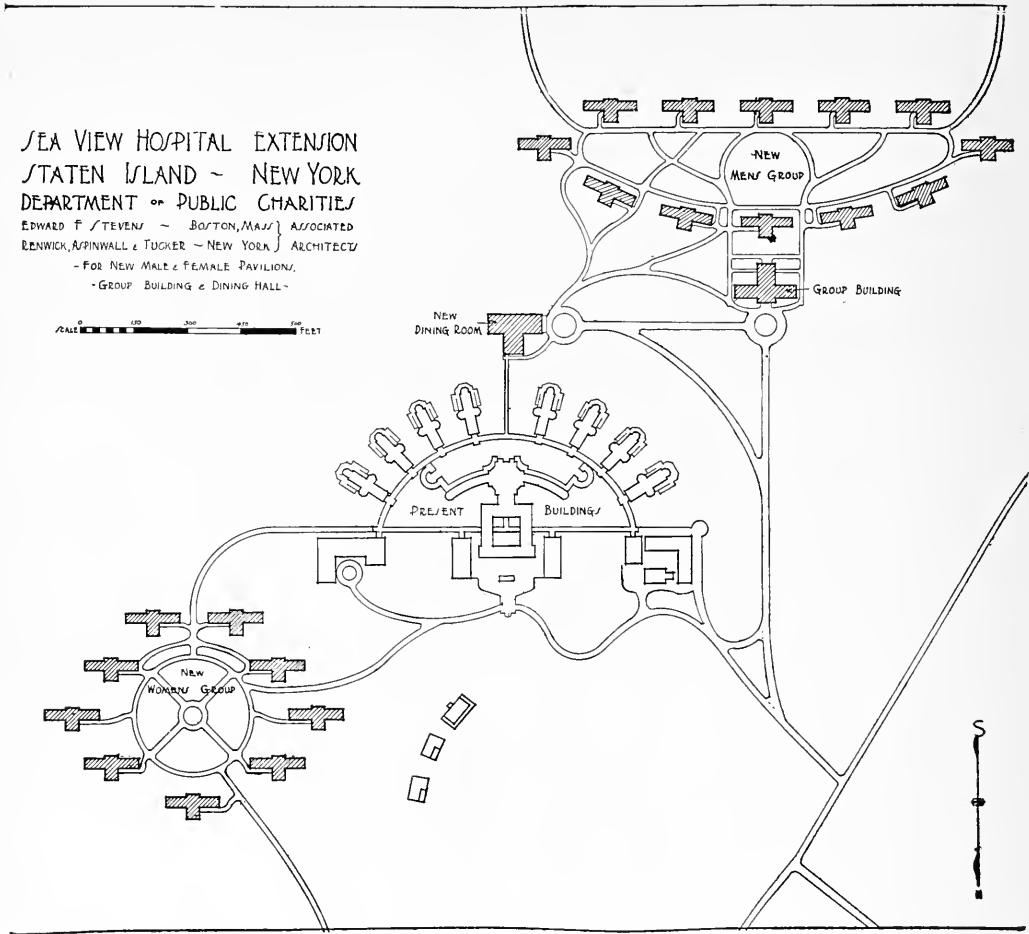


FIG. 193.

Consumptives' Hospital at Mattapan will serve to illustrate the various units for different treatment of chronic and incipient cases. The ward building (Fig. 161) here shown is two stories in height. Each unit is divided in the center, and the main service rooms are placed between the two fourteen-bed wards. Ample airing balcony space is provided, and the unit has proved easy of administration. For the more active patients the one-story pavilions (Fig. 162) are used.

This unit is similar to those used in other State and City hospitals, and has been fully described and classified by Dr. Carrington.* Larger locker space is provided for the patients, additional airing balcony for each bed, an emergency room, and a room for the nurse, as well as a large day room accessible to each division. The building is of wood, in simple, picturesque style.

*Published by National Association for the Study and Prevention of Tuberculosis, 105 E. 22nd St., New York.

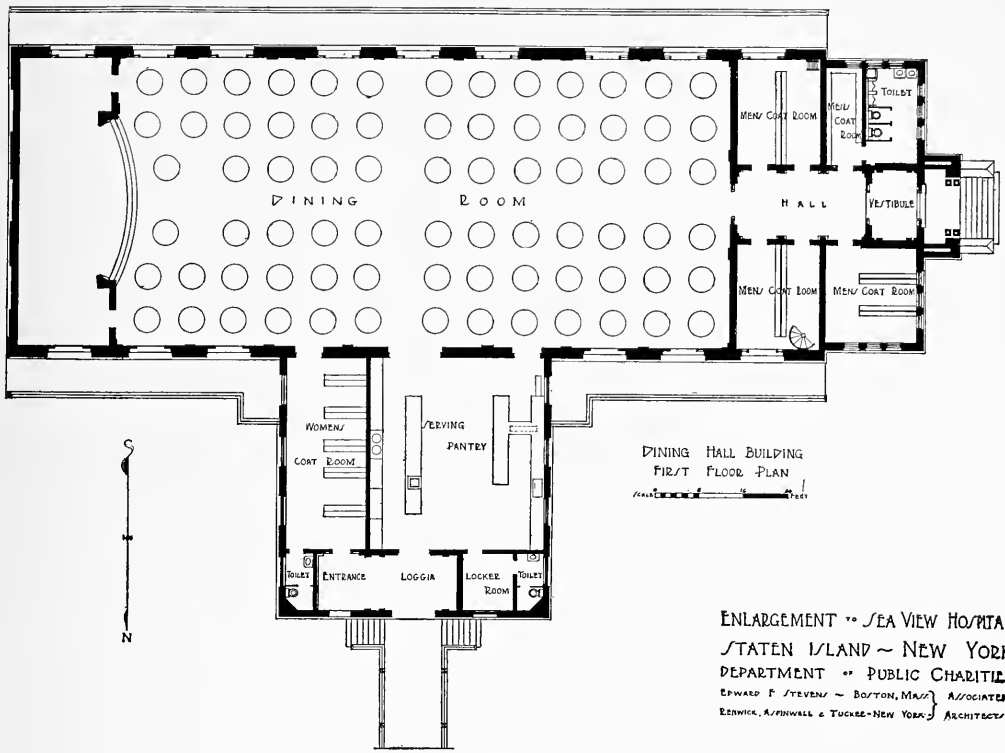


FIG. 194.

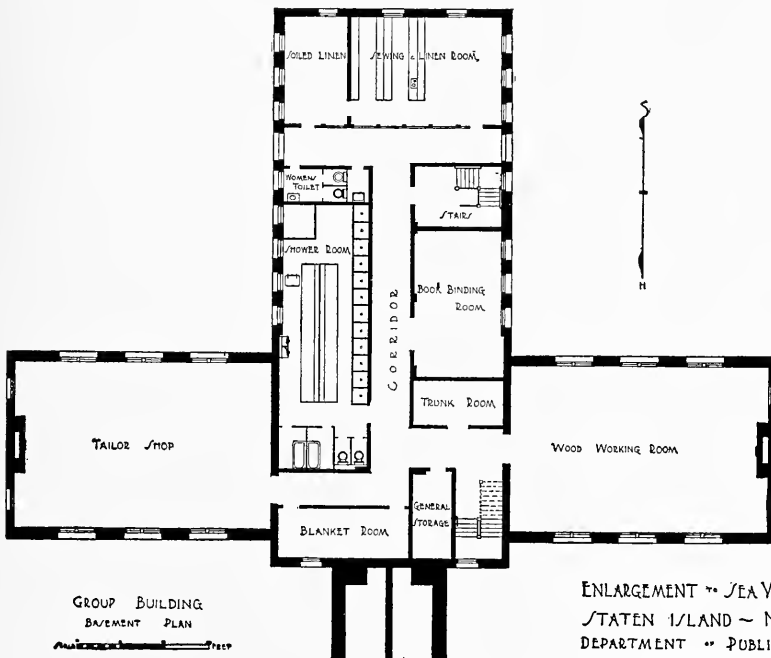


FIG. 195.

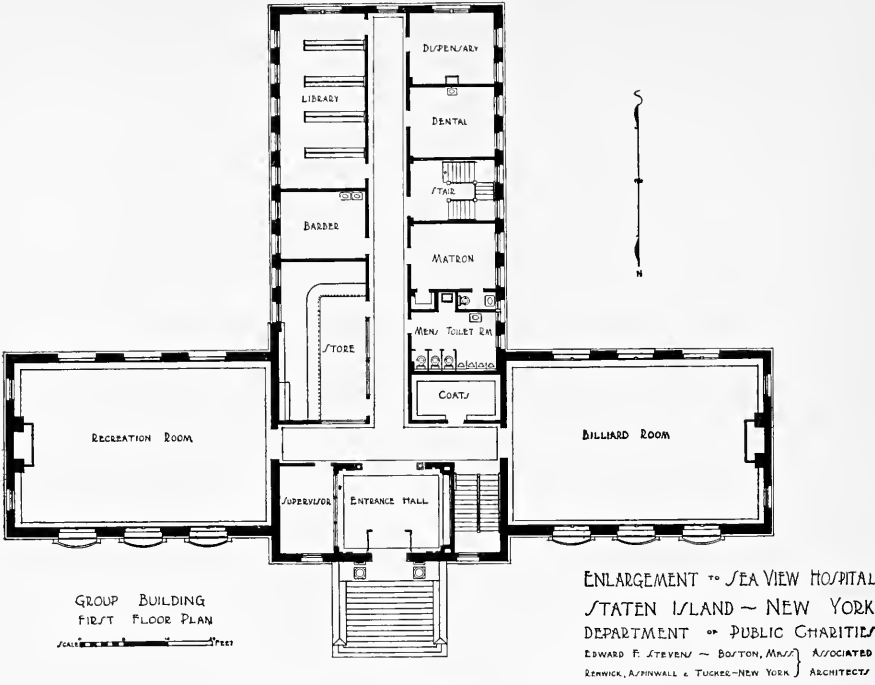


FIG. 196.

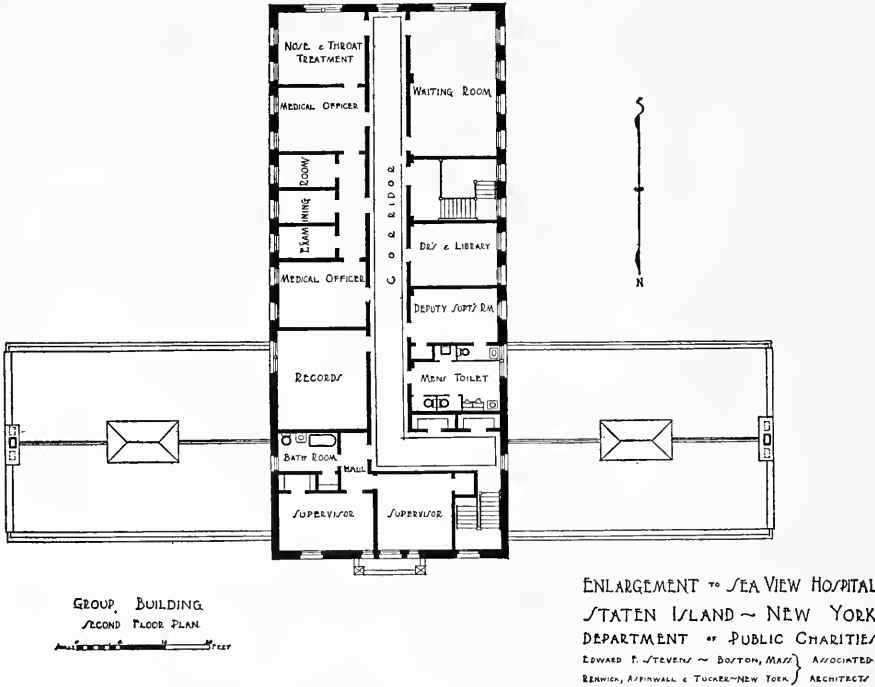


FIG. 197.

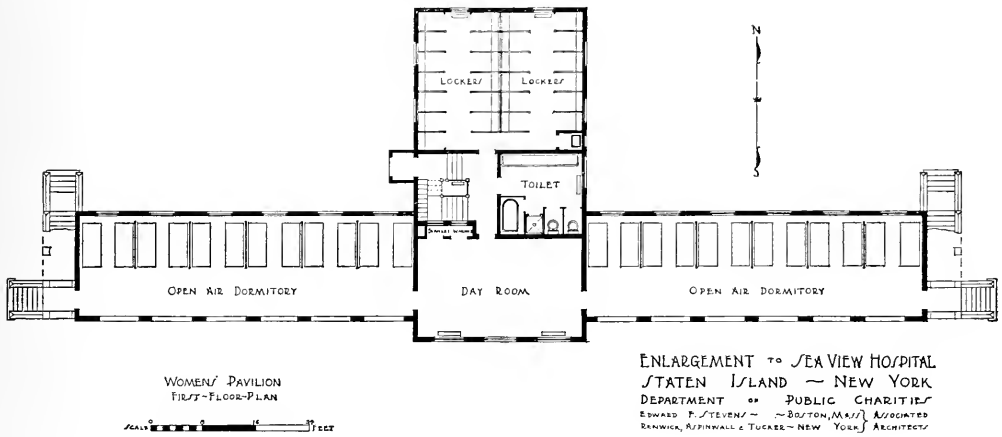


FIG. 198.

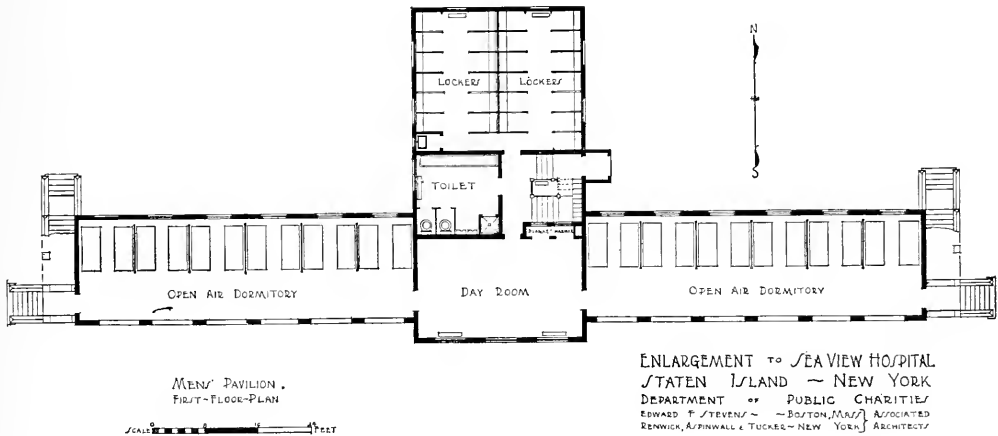


FIG. 199.

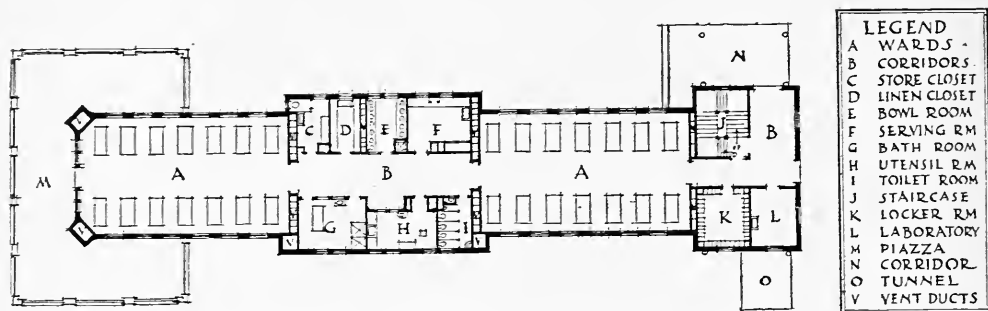


FIG. 201. BOSTON CONSUMPTIVES' HOSPITAL, WARD BUILDING.
Maginnis & Walsh, Architects.

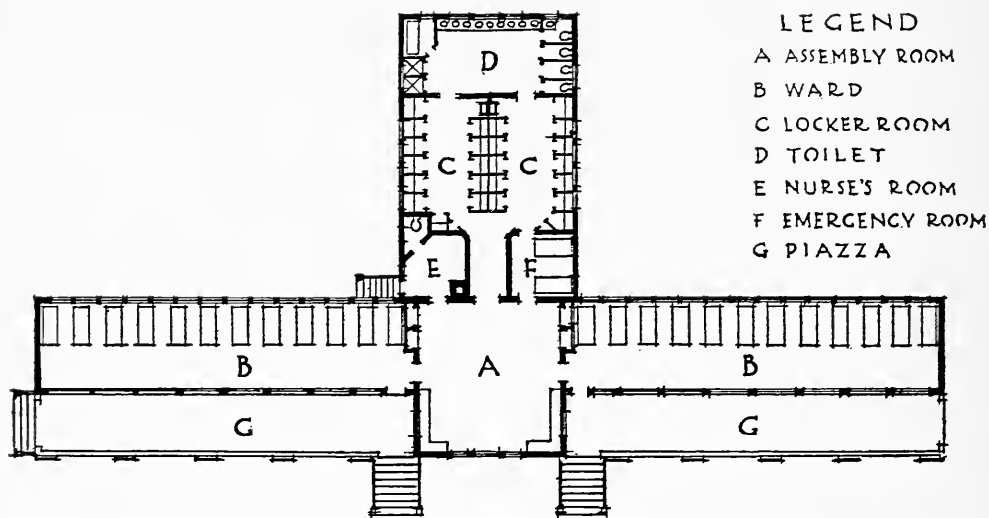


FIG. 202. BOSTON CONSUMPTIVES' HOSPITAL, COTTAGE FLOOR PLAN.
Maginnis & Walsh, Architects.

CHAPTER XI.

Special Departments

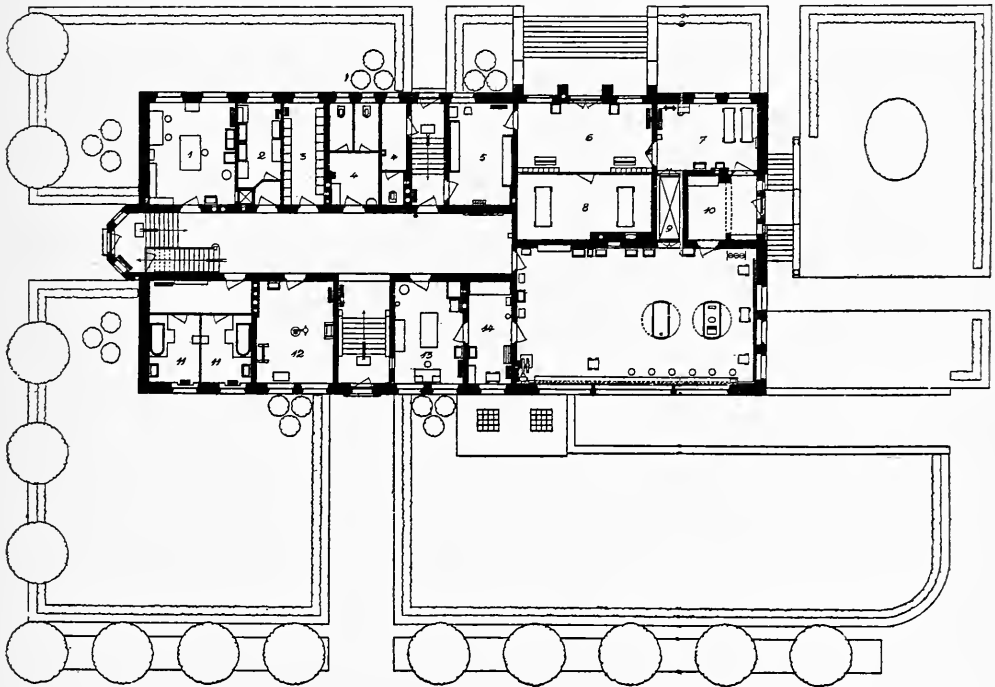
Under this section will be briefly mentioned the following departments and a few examples given:

*Pathological and laboratory work,
Roentgen-ray work,
Out-patient service,
Social service work.*

The development of the *laboratory work* in the general hospital depends largely on the personnel of the staff, the proximity to established independent laboratories, and the possibility of development within the institution. In the larger hospitals, separate buildings away from the main group are de-

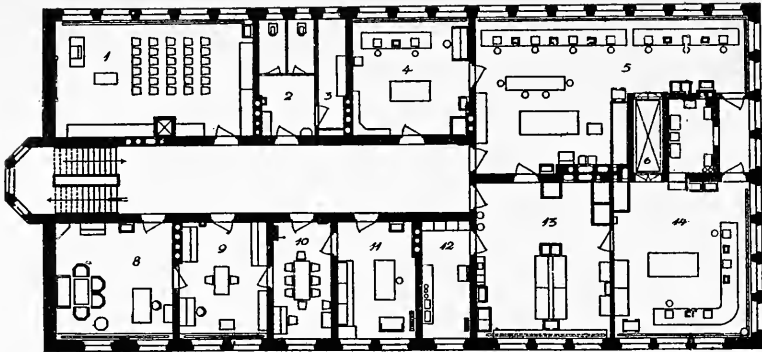
voted entirely to laboratory purposes, where there are class rooms for teaching, autopsy rooms and morgue; and often the chapel is connected with this building. These, with the local laboratories in the ward units and the operating units, form a chain for diagnostic and research work.

In the small hospital, however, of fifty beds or less, where the laboratory work is done by members of the staff, it is not necessary to provide extensively. Light basement rooms will generally serve for the purpose, the principal necessity being light.



- | | | | |
|-----------------|--------------------------------|-------------------|------------------|
| 1 Spülraum. | 5 Waschkraum. | 9 Aufzug. | 13 Dienerzimmer. |
| 2 Amtszimmer. | 6 Aussegnungsballe. | 10 Korpulenz. | 14 Vorzimmer. |
| 3 Kleidekabine. | 7 Kammern für die Leichenfrau. | 11 Bad. | 15 Sozialsal. |
| 4 Aborte. | 8 Aufbahrungsraum. | 12 Röntgenzimmer. | |

FIG. 210. MUNICH-SCHWABING HOSPITAL. PATHOLOGICAL BUILDING. FIRST FLOOR PLAN.



- | | | | |
|---------------------------------|--------------------------------|-----------------|-----------------------------|
| 1 Sammlungs- u. Vorlesungsraum, | 5 Histologisches Laboratorium, | 9 Bücherz., | 13 Chemisches Laboratorium, |
| 2 Abort, | 6 Aufzug, | 10 Lesezimmer, | 14 Bakteriolog. " |
| 3 Nebenraum, | 7 Bräutraum, | 11 Vorzatsraum, | " " |
| 4 Laboratorium d. Prosektors, | 8 Zimmer des Prosektors, | 12 Wageraum, | |
- M. 1:100.

FIG. 211. MUNICH-SCHWABING HOSPITAL. PATHOLOGICAL BUILDING. SECOND FLOOR PLAN

For the larger research laboratories, space for the hygienic care of animals used in experimentation must be provided, either on the roof of the building or even in a separate building; but if they must be kept on lower levels, the rooms should receive special ventilation.

Every hospital, even of fifty beds or less, should have a room where autopsies

can be performed, and suitable equipment for the same should be furnished. This room must be well ventilated, should have a flushing floor drain, simple autopsy table, with sink and facilities for properly handling the body. Good day lighting is desirable but not necessary; but there must be an abundance of artificial light.



FIG. 212. MUNICH-SCHWABING HOSPITAL. DISSECTING ROOM.

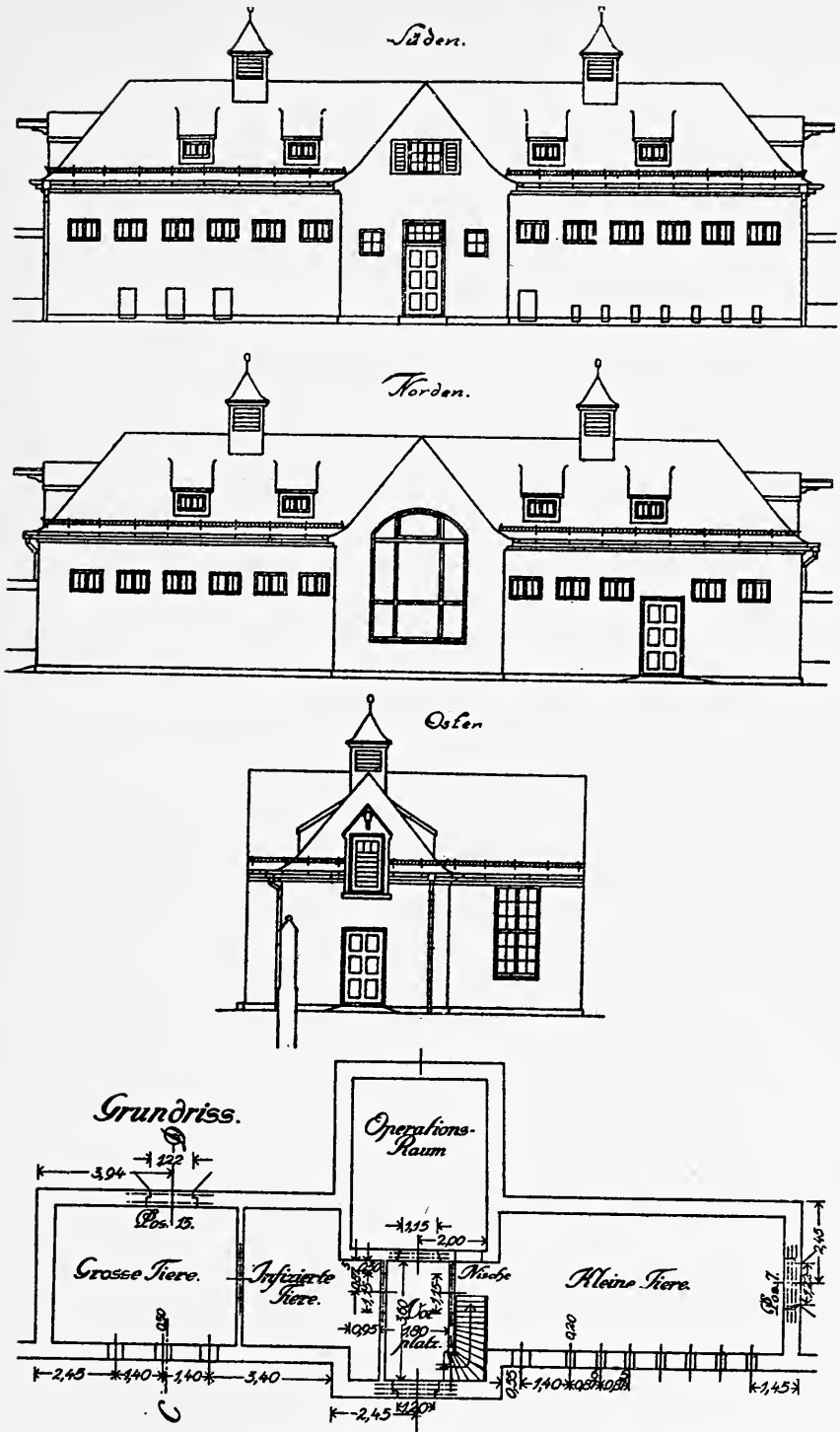


FIG. 213. MUNICH-SCHWABING HOSPITAL. PATHOLOGICAL DEPARTMENT. ANIMAL BLDG.
Richard Schachner, Architect.

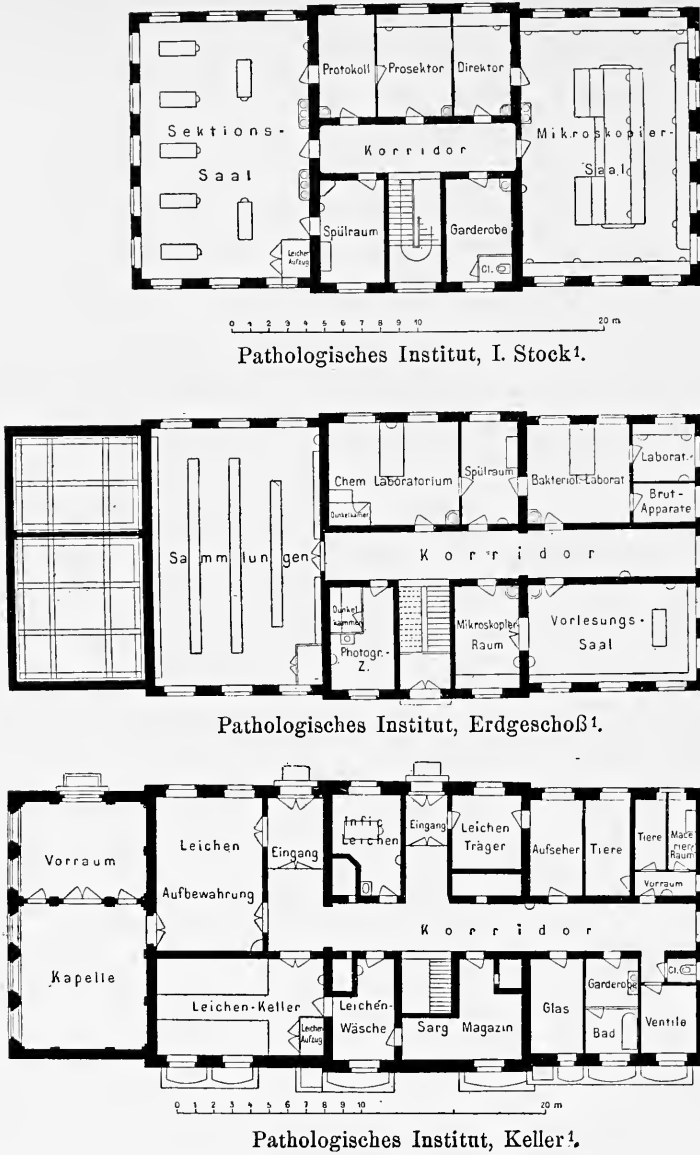


FIG. 214. ST. GEORG HOSPITAL.

In the larger hospitals in Europe, the *pathological department* is under separate management. The plans of the Pathological Institute of the Munich-Schwabing Hospital are here shown (Figs. 210 and 211) and are self-explanatory. The detail and equipment are excellent, the dissecting room in particular (Fig. 212) showing most careful atten-

tion to plumbing and outfit. In this institution there is a separate building (Fig. 213) for animals, with special operating room perfectly equipped. The pathological building at St. Georg is another carefully developed department, as the few illustrations will show (Figs. 214 and 215).

The *Roentgen-ray*, in its divers uses,

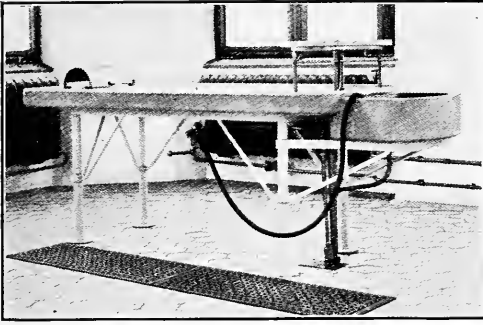


FIG. 215. ST. GEORG HOSPITAL. DISSECTION
TABLE.

plays a most important part in the work of every hospital. Its use in diagnoses

has become invaluable. While it is true that the best results can be obtained by only the expert roentgenologists, nevertheless even the limited use of the X-ray in the small hospital is most helpful.

The advance in the possibilities of uses to which the Roentgen-ray can be put is so rapid that no attempt will be made to show them now. We know, however, that the recurrent use of this powerful medium has caused serious burns and the destruction of live tissue so that the operators should have every possible protection. Lead screens afford this protection against both direct and reflected rays. It is more common now to provide control rooms heavily lined with lead at least one-eighth inch thick ;

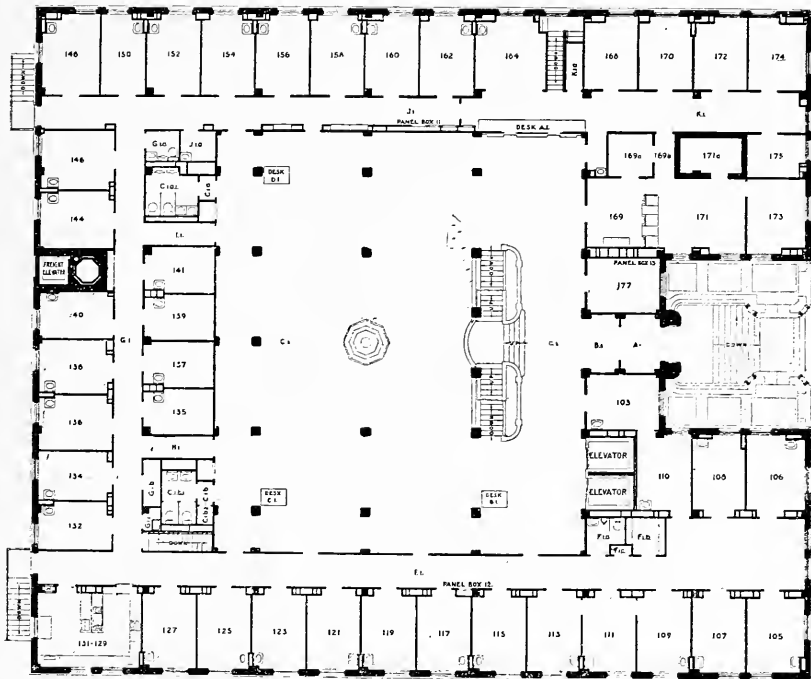


FIG. 216. MAYO CLINIC, ROCHESTER, MINN. FIRST FLOOR PLAN.
Ellerbe & Round, Architects.

Room 107	} Consultation rooms.	Room 123	} Consultation rooms.	Room 148	} Consultation rooms.	
Room 105		Room 125		Room 150		
Room 106		Room 127		Room 162		
Room 108		Room 132		Room 154		
Room 110		Room 134		Room 156		
Room 103		Room 138		Room 158		
Room 109	C. H. Mayo, Consulta- tion.	Room 136	Room 160	Room 152	} Stenographers.	
Room 111	Reception, W. J. and C. H. Mayo.	Room 140	Room 162	Room 174		
Room 113	W. J. Mayo, Consulta- tion.	Room 144	Room 164	Room 172		
		Room 146	Room 170	Room 168		
Room 115	} Consultation rooms.	Room 135	Clinical.	Room K1		Mail distribution.
Room 117		Room 137	Clinical.	Room 175		Dictaphone.
Room 119		Room 139	Clinical.	Room 173	Office.	
Room 121		Room 141	Hospital assignment.	Room 177.	Office telephone central.	
		Room 164	Alphabetical index.			
		Room 169	Accounts.			

and where vision is required, lead glass is used for the operator.

A few precautions may be mentioned in providing for this department:

In selecting Roentgen laboratory avoid cellar, particularly if it is damp; moisture causes trouble with the transformer and high tension wiring.

The room should be sufficiently high studded to allow overhead high tension system.

The X-Ray transformer requires a special electric current supply. Do not rely on the word of a local electrician or power company.

Special precaution should be taken that

all electric light conduits in Roentgen room are properly grounded.

Arrangements should be made for a perfect ground near position of X-Ray transformer.

The room to be used for fluoroscopy should be so arranged that it can readily be made light proof.

Special lead protection is necessary where the Coolidge tube is used for X-Ray therapy.

The dark room, for developing and loading plates, should be located as near the Roentgen laboratory as possible.

Hot water, as well as cold running water, in the dark room is desirable.



FIG. 217. MAYO CLINIC. SECOND FLOOR PLAN.
Ellerbe & Round, Architects.

Room 271 Cystoscopic.
Room 273 Private office, Braasch.
Room 201 Cystoscopic.
Room 203 Cystoscopic.
Room 205 Refraction.
Room 209 Eye.
Room 209a Eye.
Room 213 Eye.
Room 215 Nose and throat.
Room 221 Nose and throat.
Room 227 Laboratory, bacteriological.
Room 227a Laboratory, parasitological.

Room 232 Clinical.
Room 228 Clinical.
Room 226 Clinical, blood cultures, etc.
Room 224 Clinical.
Room 222 Clinical.
Room 220 Clinical.
Room 259a X-ray indexing.
Room 278 X-ray viewing.
Room 249a X-ray storage.
Room 249 Fluoroscopic.
Room 249a Fluoroscopic.
Room 248 Food preparation.
Room 248a Exposure, X-ray.

Room 250 Exposure, X-ray.
Room 252 Exposure, X-ray.
Room 254 Exposure, X-ray.
Room 258c Developing.
Room 258b Developing.
Room 264 Exposure.
Room 268 Exposure.
Room 270 Exposure.
Room 274 Exposure.
Room 275 Private office.
Room J2b Toilet, men, special, public.
Room J2b Toilet, women, special, public.

This department should be planned for at the beginning, not left to chance.

The writer knows of no more extensive use for diagnoses than at the Mayo Clinic (Figs. 216, 217, 218, 219) at Rochester, Minn. Nearly half of the second floor of this large building is devoted to this form of diagnosing.

The space allotted to this work in the various plans shown may be noticed—Ohio Valley General Hospital (Figs. 77 and 220), Youngstown Hospital (Fig. 74), Barre Hospital (Fig. 239), etc.

Today nearly every large hospital in the country has an *out-patient and social service department*, where more or less dispensary work is afforded people who are not enrolled as patients of the hospital, or more home care is provided.

The problem of how best to serve this class without lessening the service to the in-patients is one needing much study.

The location of the hospital in the community, the likelihood of casualties, and the nearness to other dispensaries have a bearing on the development of this department. Except, perhaps, in the large city communities, this dispensary or out-patient service can be rendered more effectively in connection with the general hospital; for the reason that many of the departments can be used in common, such as the drug room, the Roentgen-ray department, the hydro- and mechano-therapeutic departments, the heating plant, and, in emergencies, the service of members of the staff and nursing forces.

The size and shape of this department must be governed by the needs and the available space. If the call is small, it may be placed safely in the basement of one or more of the hospital buildings, or on certain floors set apart for this purpose.

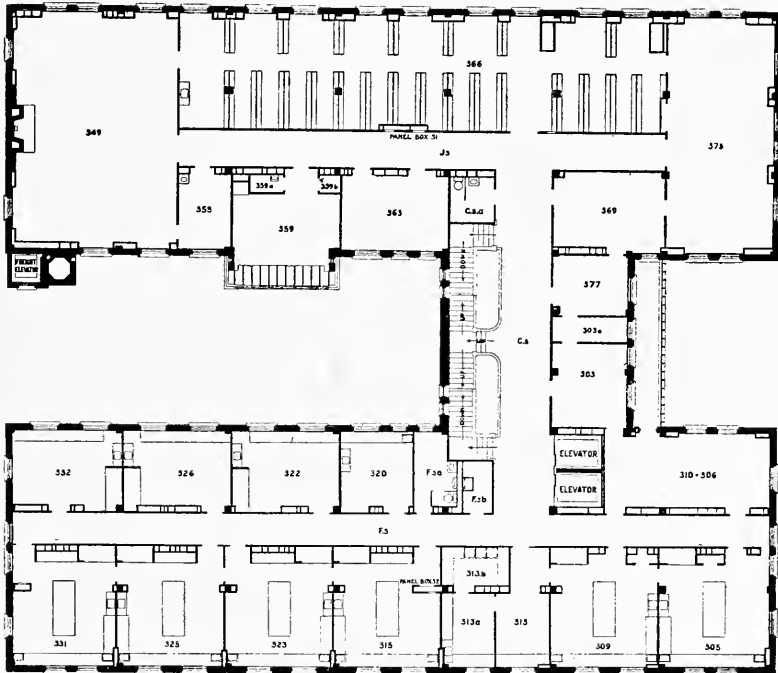


FIG. 218. MAYO CLINIC. THIRD FLOOR PLAN.

Ellerbe & Round, Architects.

Room 377 Editorial.
Room 303 Editorial.
Room F3a Toilet staff men.
Room 305 Pathological laboratory.
Room 309 Pathological laboratory.
Room 313 Stenographic.

Room 315 Pathological laboratory.
Room 323 Pathological laboratory.
Room 325 Pathological laboratory.
Room 331 Chemical laboratory.
Room 363 Reading.

Room 320 Pathological laboratory.
Room 359 Artists' studio.
Room 355 Coat room.
Room 349 Assembly room.
Room 366 Stock room.
Room 375 Reading room.
Room 369 Reprints.

Mackintosh* says, "The out-patient department should be a one-storied building, quite apart from the hospital."

Whether this department be in a separate building of one story or multi-story, or connected with any other department, there are certain practical principles which must be considered. The waiting-room should be large, well-lighted, and, above all, well ventilated and centrally located, with the seating space so arranged as to give perfect circulation and prevent congestion.

The entrance should be large and well protected from storms. As many of the out-patients are children-in-arms, adequate provisions must be made for the perambulators and wheel chairs, at or near the street level.

Where practicable, the exit should be

*"Construction, Equipment and Management of a General Hospital," by Donald Mackintosh, M.B.

a separate door. Near this door can be located the laboratory and the pharmacy.

Near the preliminary examination desk there should be isolation rooms, with a separate exit for any suspicious case or case of communicable disease.

The arrangement and division of departments may depend on the respective service.

The L-shaped building often affords a better division of departments than the rectangle, since the large waiting-room can be placed at the junction of the two wings, giving better supervision from the administrative center.

Near the entrance should be the office of the department, the examining rooms, and the social service workers' office.

In the small service, by the use of different rooms at different hours and by a slight change in equipment, the treatment of the different diseases can be ac-

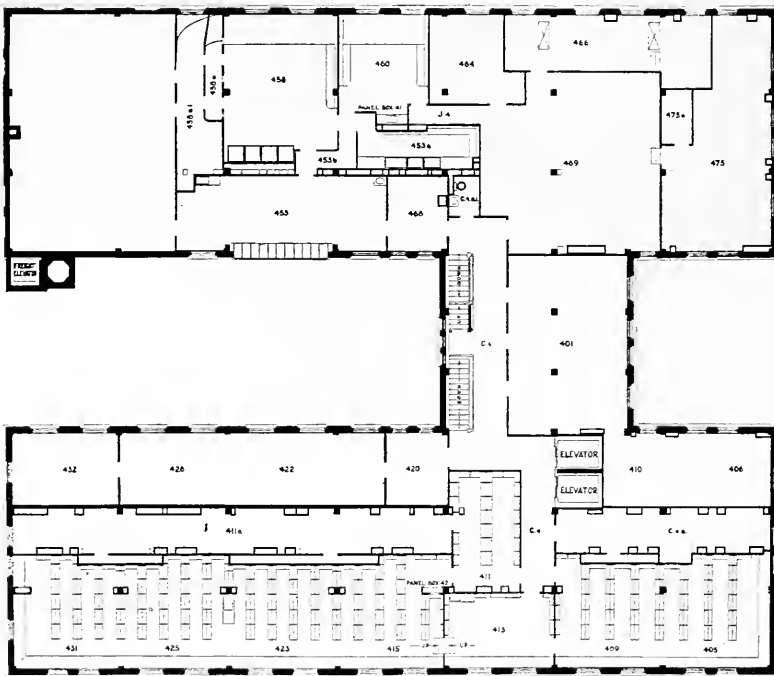


FIG. 219. MAYO CLINIC, ATTIC.
Ellerbe & Round, Architects.

Room 401 Store room.
Room 409-405 Pathological museum.
Room 411 Pathological store room.
Room 420 Drafting.

Room 413 Pathological preparation.
Room 422 Shop.
Room 469 X-ray store room.
Room 466 X-ray machines.
Room 464 X-ray dry plates.

Room 460 Photographic store room.
Room 458 Bromide room.
Room 453a Developing.
Room 468 Waiting room.
Room 453 Photographic gallery.

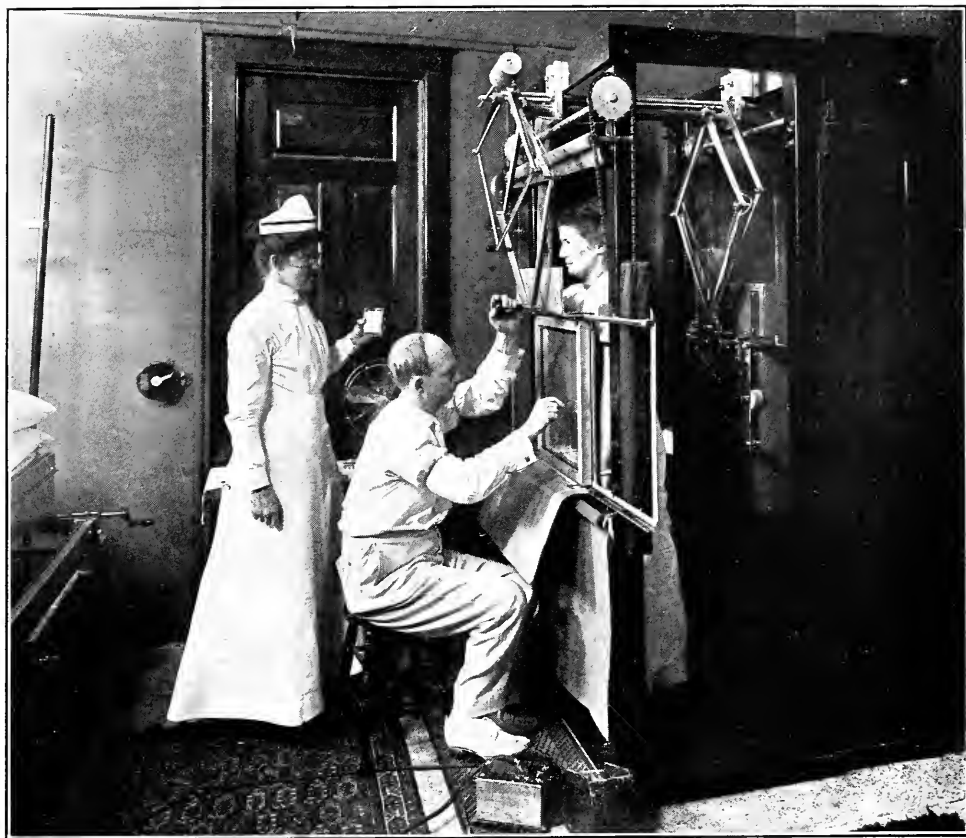


FIG. 220-A. UPRIGHT FLUOROSCOPE.

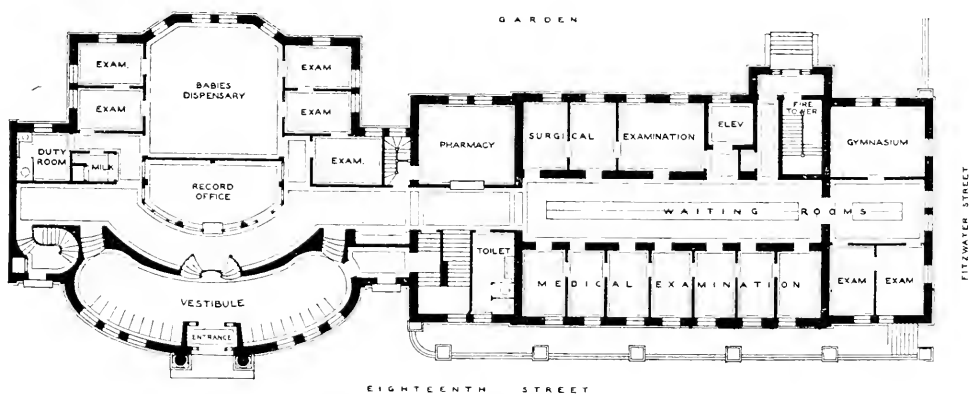


FIG. 222. CHILDREN'S HOSPITAL, PHILADELPHIA. OUT-PATIENT DEPARTMENT.

complished; in fact, splendid work can be done in a very small space. But the ideal out-patient department should have space and divisions for general medical clinic, children's clinic, surgical clinic, gynecology clinic, genito-urinary clinic, eye-ear-nose-and-throat clinic, and dental clinic; and as the department grows, separate space should be provided for

orthopedic, nervous and mental diseases, and for the treatment of tuberculosis, whooping cough, and vaginitis. Since the recent epidemics of infantile paralysis, separate departments have been established for the after-care of such patients. The work of examination and treatment is facilitated if provision is made

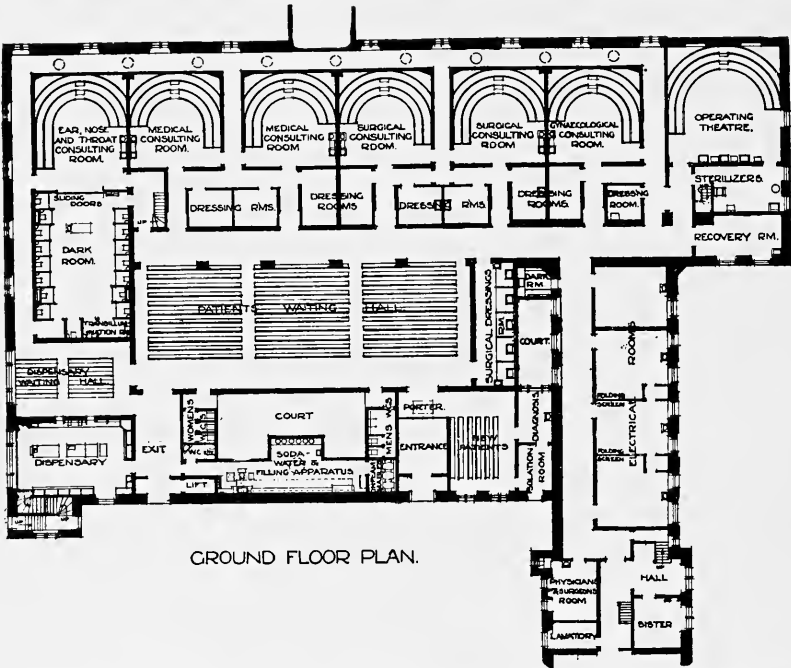


FIG. 221. WESTERN INFIRMARY. GLASGOW OUT-PATIENT DEPARTMENT.

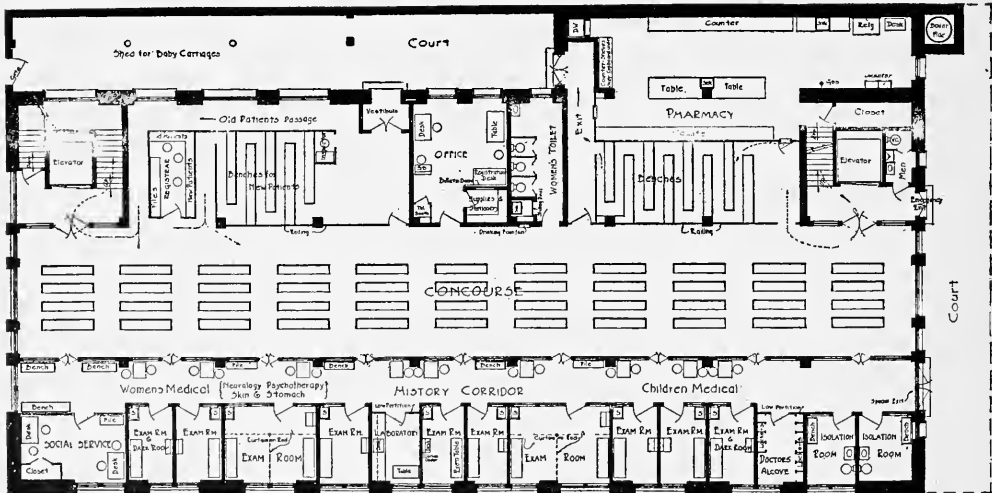


FIG. 223. PROPOSED OUT-PATIENT DEPARTMENT FOR NEW YORK CITY. FIRST FLOOR. Designed by S. S. Goldwater, M.D.

for patients to wait at or near the treatment rooms. In some cases, separate waiting-rooms or history corridors are provided where the assistants can take down the history and prepare the patient for examination or treatment.

In providing for the clinics, the larger services such as the medical and children's services should be located on the entrance floor, in order to avoid congestion. The orthopedic, with the plaster work and brace shop, may well be located in the basement.

As to the size of the treatment rooms,

there may be a difference of opinion; one man may wish a large room with, perhaps, cloth screens dividing the patients, another, a small room opening from the general room of that service, where any conversation will not be overheard by the patients nearby. If the small room is used, the ventilation should be assured and positive. If the rooms are to be used for teaching purposes, they should be of larger size.

In the surgical department, there should be the complete operating room with its adjuncts—the sterilizing and

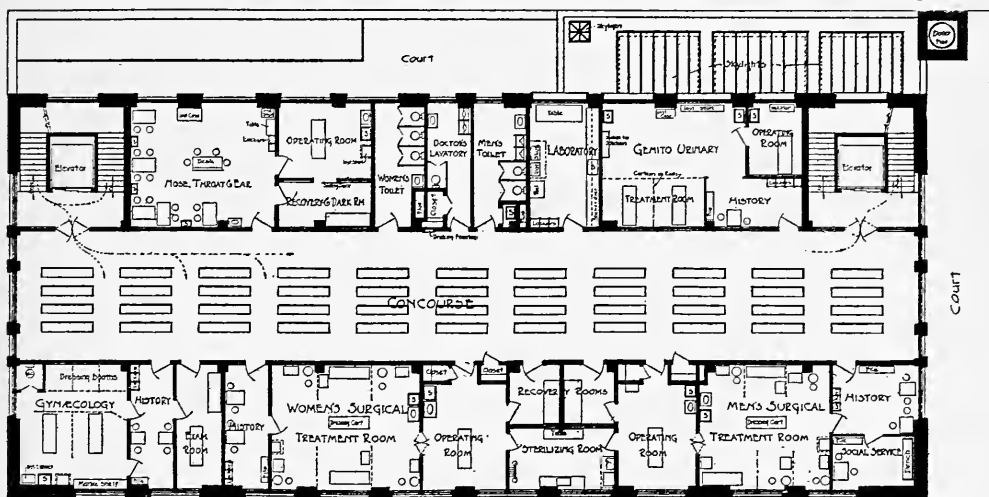


FIG. 224. OUT-PATIENT DEPARTMENT FOR NEW YORK CITY. SECOND FLOOR.
Designed by S. S. Goldwater, M.D.

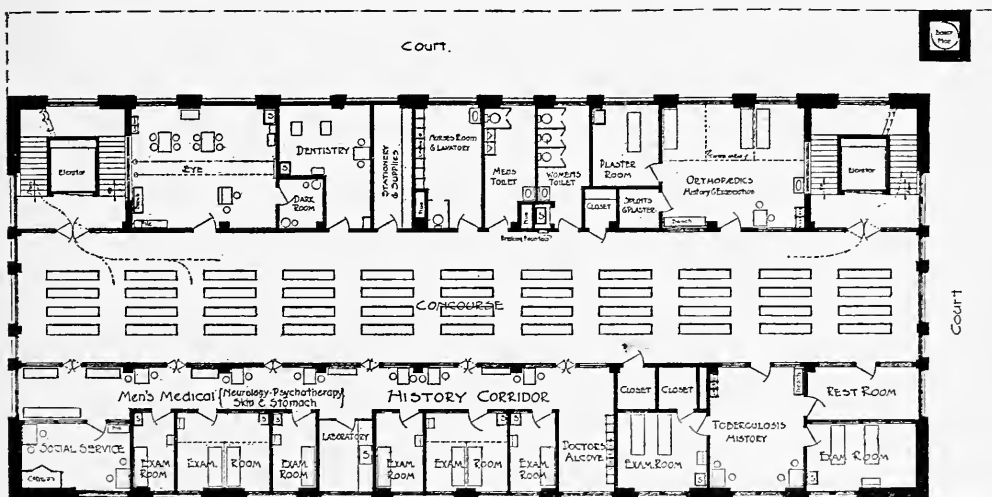


FIG. 225. OUT-PATIENT DEPARTMENT FOR NEW YORK CITY. THIRD FLOOR.
Designed by S. S. Goldwater, M.D.

anaesthetic room; and as many of the minor operations are performed under anaesthetics. Recovery rooms should also be provided.

Each clinical division should be made a complete working unit, with proper plumbing fixtures, cabinets, and supplies for disinfecting against contagion, and apparatus for sterilization of instruments, etc.

The floors, the walls, the ceilings, and the furniture should be of a material readily scrubbed and of simple design. The waiting room, however, should not be void of artistic merit, for even with the out-patient, the environment should tend to benefit the mind as the treatment does the body.

While the *social service* work in connection with hospitals and out-patient departments is a development of recent years, nevertheless it has become a most important and necessary adjunct. It is truly a twentieth-century development, starting in Boston in 1905 through Dr. Richard Cabot, who introduced the social worker as a means of securing more accurate diagnosis and rendering more effective treatment.

The social worker co-operates with the clinician. Together they take the history, one examines the patient, the other "investigates the social cause of the ailment." The physician prescribes; the social worker "follows up" the homelife, sees that the instructions of the physician are carried out, and encourages better home environment. It is obvious that if the instructions of the medical man in the clinic are not carried out, the time is wasted and the patient returns without benefit. The social service worker renders here invaluable service to the hospital, to the dispensary, and to the public.

The subject of the out-patient and social service departments has been so ably covered by Mr. Michael M. Davis, Jr.,* Dr. Andrew R. Warner, and Miss Ida M. Cannon† that it would be presumptuous in the writer to enlarge more on the subject.

*"Dispensaries—Their Organization and Management" (in press).

†"Social Work in Hospitals, Russell Sage Foundation."

A few illustrations, however, may serve to show the planning of a few departments of this kind.

A more complete out-patient department is hardly to be found than that of the *Western Infirmary* at Glasgow (Fig. 221). From the time the patient enters until he leaves, it is not necessary for him to cross his own path. He finally comes up in front of the dispensary and goes thence to the exit.

At the entrance is the preliminary waiting-room for new patients, with its isolation and diagnosis room; then the large central waiting; the special treatment room for eye, ear, nose, and throat; for minor dressings; and the various surgical and medical clinic rooms, with dressing-rooms connected; each unit a teaching theatre, with circular benches for students, with the dispensary near the exit.

A special students' entrance is provided, with corridor above and exit passage, connecting with each of the clinic rooms.

The first building of the *Children's Hospital*, Philadelphia, to be built is that for *out-patients*. Entrance is through a large vestibule arranged for the storage of baby carriages. A record office fills a commanding position. The babies' dispensary, with examining rooms and a milk and duty room adjoining, occupies the central position in the rear of the record desk. The medical and surgical examining rooms use the rest of the first floor (Fig. 222).

The plans show in the basement the detention room for suspected cases, a whooping-cough clinic having a separate entrance. The X-ray, orthopedic, and plaster rooms are on this floor. The eye, ear, nose, and throat treatment and utility rooms are on the second floor; also the operating and recovery rooms. The third floor is occupied by the laboratories.

The plan of an ideal out-patient department suggested by Dr. S. S. Goldwater in Mr. Henry C. Wright's* report on City Departments of New York, shows the working out of a three-story

*Report of Committee on Inquiry into Hospitals and City Homes of New York City.

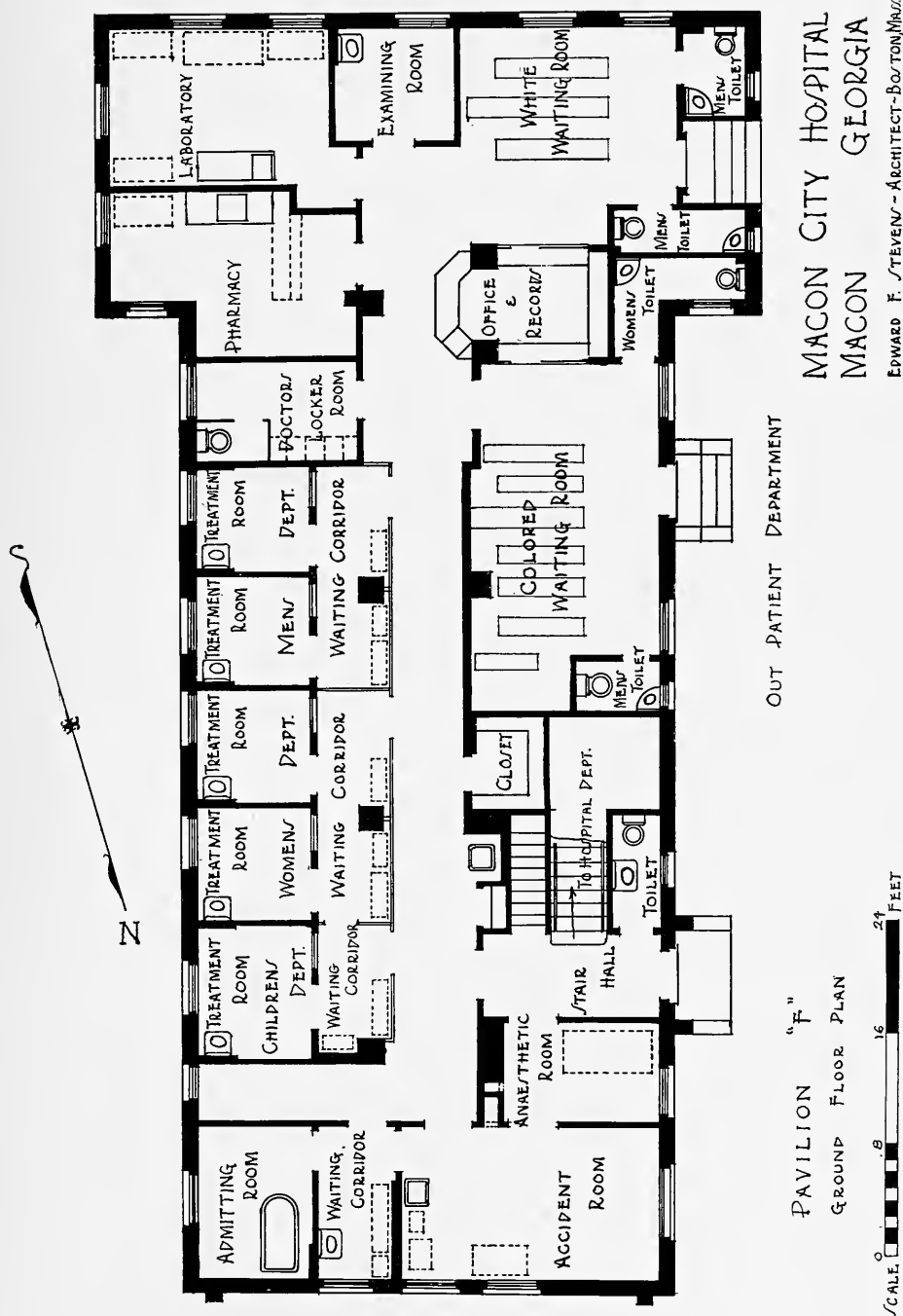


FIG. 226.

out-patient department on a restricted city site with buildings adjacent. The plans (Figs. 223, 224, 225) show the possibilities of such a site and the placing of the rooms and corridors to conserve light, assure circulation, and afford ease in the handling of patients.

The small out-patient department (Fig. 226) of the *Macon Hospital*, where the problem of serving the colored as well as the white must be met, shows the possibilities of even a small unit.

The waiting-rooms for both white and colored are supervised from one desk.

The treatment rooms, however, are not divided. A complete operating department is here provided, which will serve, to a certain extent, for minor operations for the colored patient, the wards for whom are on the second and third stories of this building.

The dispensary building for the *East New York Hospital*, for the time being, will serve for dispensary and hospital. As shown by Figs. 227 and 228, a portion of the ground floor and all of the second will be used for out-patient service. Worked out on the "L" plan, with the waiting-room at the junction of the

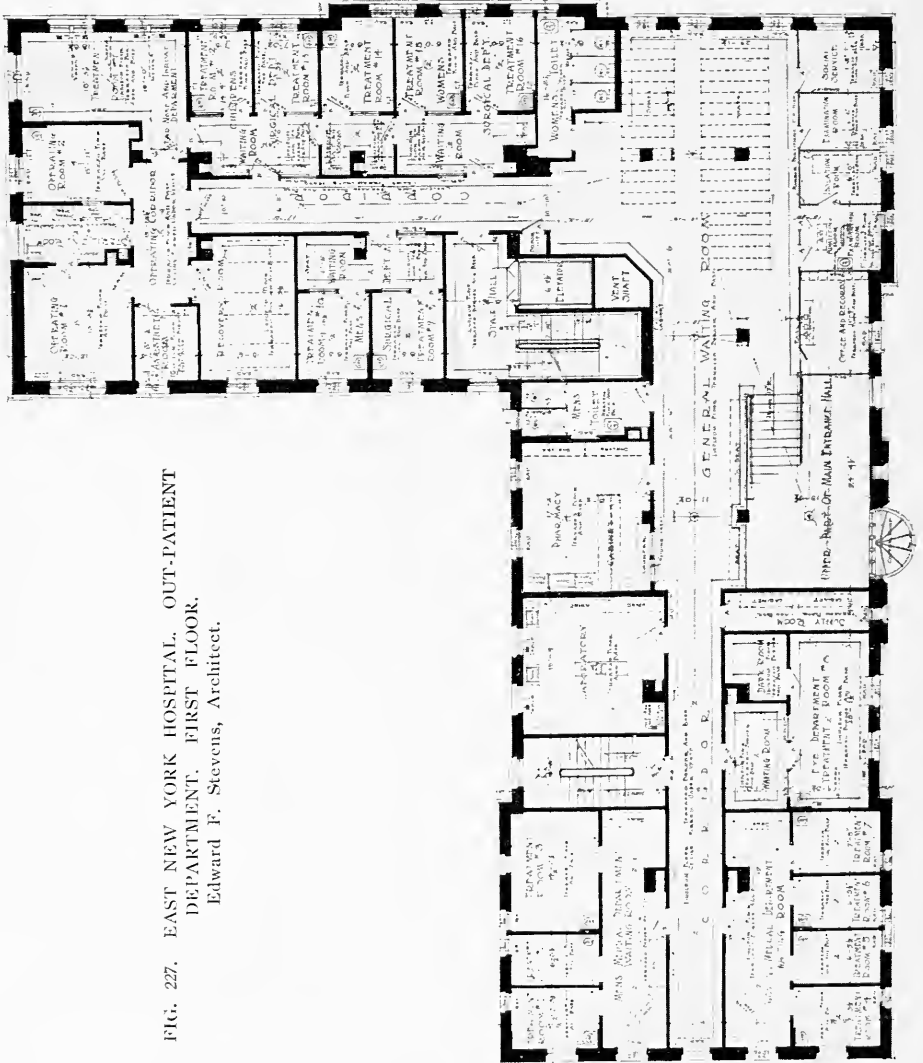


FIG. 227. EAST NEW YORK HOSPITAL. OUT-PATIENT DEPARTMENT. FIRST FLOOR.
Edward F. Stevens, Architect.

two wings and with the administration and examining rooms, the social service office, the pharmacy, and the laboratory in central locations, the problem of caring for the patients should be simple. The X-ray and hydro departments are on the ground floor.

While the in-patient work of the Hospital for Sick Children, at Toronto (Fig. 229), and the work at the Lakeside Home is tremendous, the *out-patient work* and the *milk dispensary* work are even greater. The entire ground and first

floors of the new contagious wing and a large portion of the first floor of the old building are used for the out-patient work. The main waiting-room connects at the left with the pharmacy; the laboratories at the rear with the hospital and pasteurizing plant and at the right with the various departments including medical, surgical, eye, ear and throat, orthopedic, etc., while in the basement is a large measles clinic, and the brace and mechanical shops for making of apparatus.

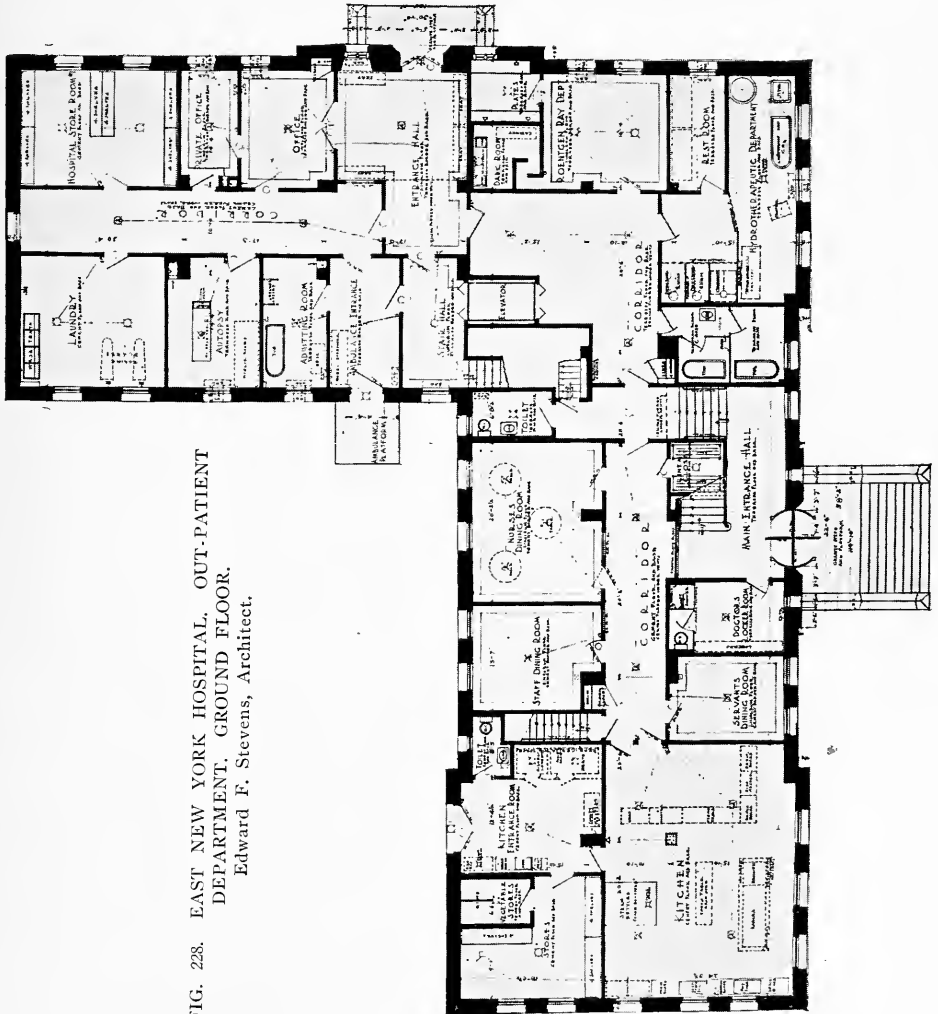


FIG. 228. EAST NEW YORK HOSPITAL, OUT-PATIENT DEPARTMENT. GROUND FLOOR.
Edward F. Stevens, Architect.

CHAPTER XII.

The Small Hospital

The development of the small hospital is largely American. While the village or small hospital may have started in England, as stated by Taylor,* the greater development has been in this country. One can find hundreds of well-planned hospitals of fifty to one hundred beds; but for the smaller private hospitals, one is more likely to find the adaptation of some dwelling, doing good service but handicapped at every turn for lack of conveniences for economical and efficient work.

Every hospital must have its beginning; few indeed can start with a complete equipment; so the remodelled house should be looked upon as the stepping stone to something more complete.

It generally happens that before the house has been fitted for hospital purposes, enough money is expended to go far toward building a suitable, up-to-date institution. Even then there will be waste and unavailable room, which must be heated and taken care of. The finish which is attractive and necessary for a residence becomes almost a menace in a hospital. The staircases and halls are generally narrow, the rooms are not properly ventilated, the toilets are badly arranged, and the floor materials are not suitable. In other words, an undue amount of energy must be expended in the housekeeping for such a building, and this will detract, in all probability, from the care of the patient.

The same standards of number and size of utilities are not applicable to a fifteen-bed that would be suitable for a fifty-bed establishment, for it would be all utilities, with no room for patients.

In the small hospital there is not the need for the separation and segregation of utilities; one room may serve for toilet, sink and bath; food may be taken directly from the kitchen to the patient;

the operating room may serve for both surgical and maternity work.

Even in the small hospital the life of the patients should be safeguarded; and the construction, the egress, the careful consideration of the patient are just as important as in a large plant. Fireproof construction may not be absolutely necessary but is always desirable, and is generally an economy in the end.

It is possible, however, to meet modern requirements in the small village hospital and at moderate expense, and the examples following will show the solution here of several problems. However small, each institution must be balanced for its special location and purpose.

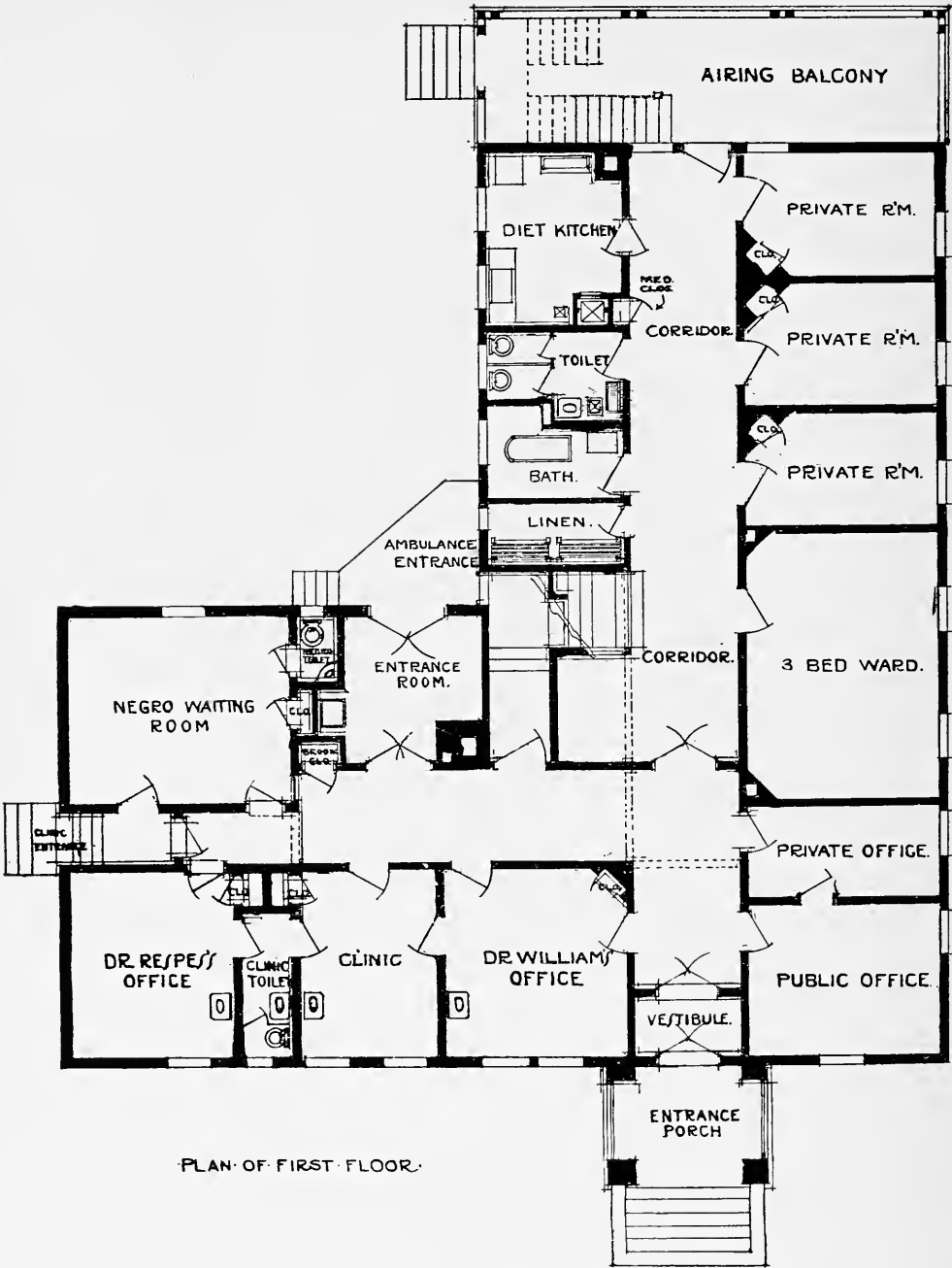
In *Dr. Williams' Private Sanatorium*, Macon, Ga. (Figs. 236 and 237), the problem was to provide for the care of both medical and surgical cases, for offices, and for an out-patient department for colored people.

The contour of the land gave the advantage of being able to place kitchen, dining-room, and store rooms in the basement and still get proper light.

The first floor is occupied by offices, reception room, out-patients' clinic, ambulance entrance, and rooms, service and airing balcony for six patients. The ambulance entrance room and clinic opposite are made sufficiently large so that minor dressings may be done here, or even a slight operation in a septic case which one would not wish to take to the main operating room. The elevator and stairway to the second floor are near this entrance.

Though small, the operating department on the second floor is complete. There is the operating room, surgeons' scrub-up room, anaesthetizing room, and sterilizing room, with complete equipment. This department is in a wing on the north side of the building and is entirely shut off from the rest of the hospital.

*Brickbuilder, January, 1904.



PLAN OF FIRST FLOOR.

FIG. 236. WILLIAMS' PRIVATE SANATORIUM, MACON, GA.
Edward F. Stevens, Architect.

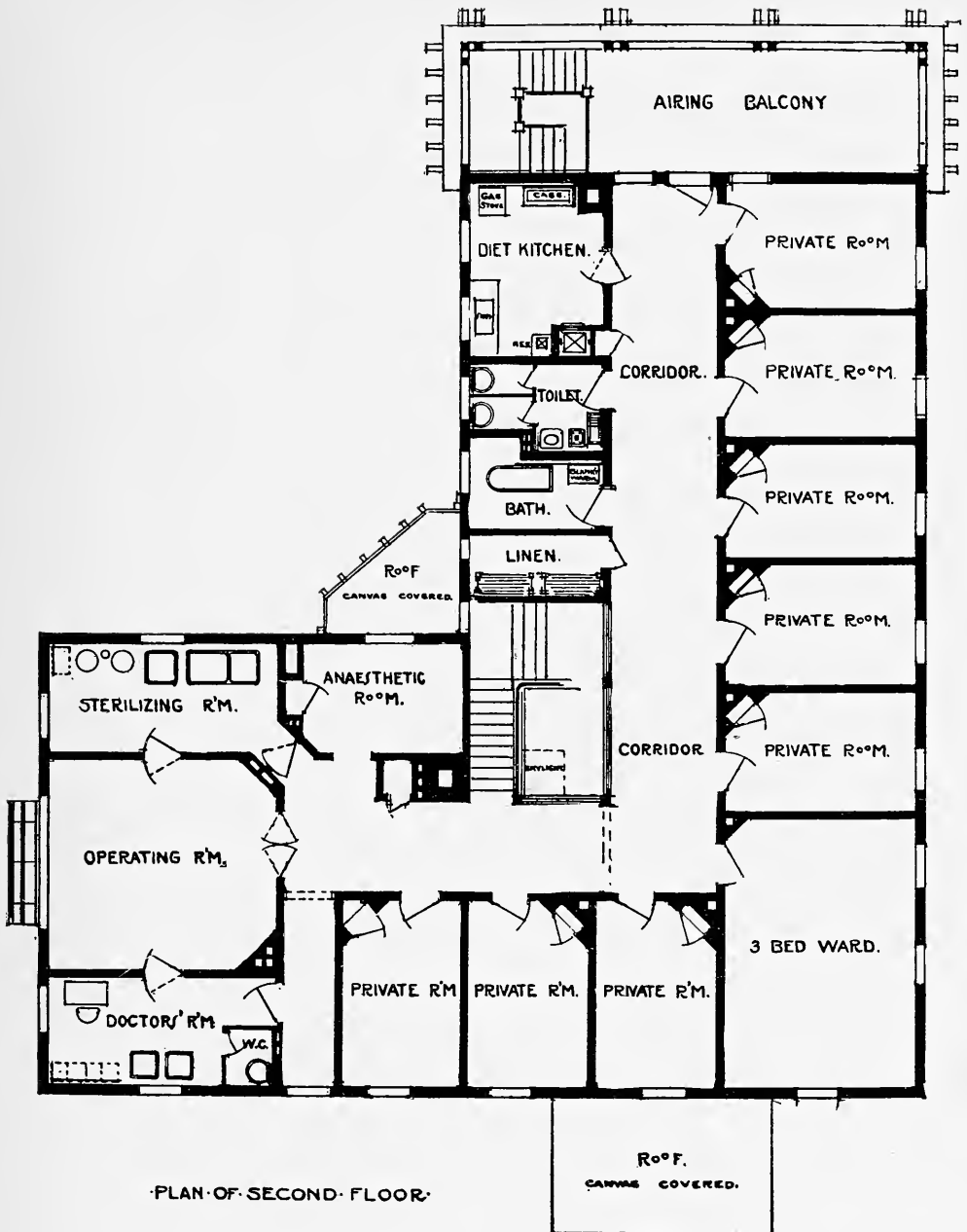


FIG. 237. WILLIAMS' PRIVATE SANATORIUM, MACON, GA.

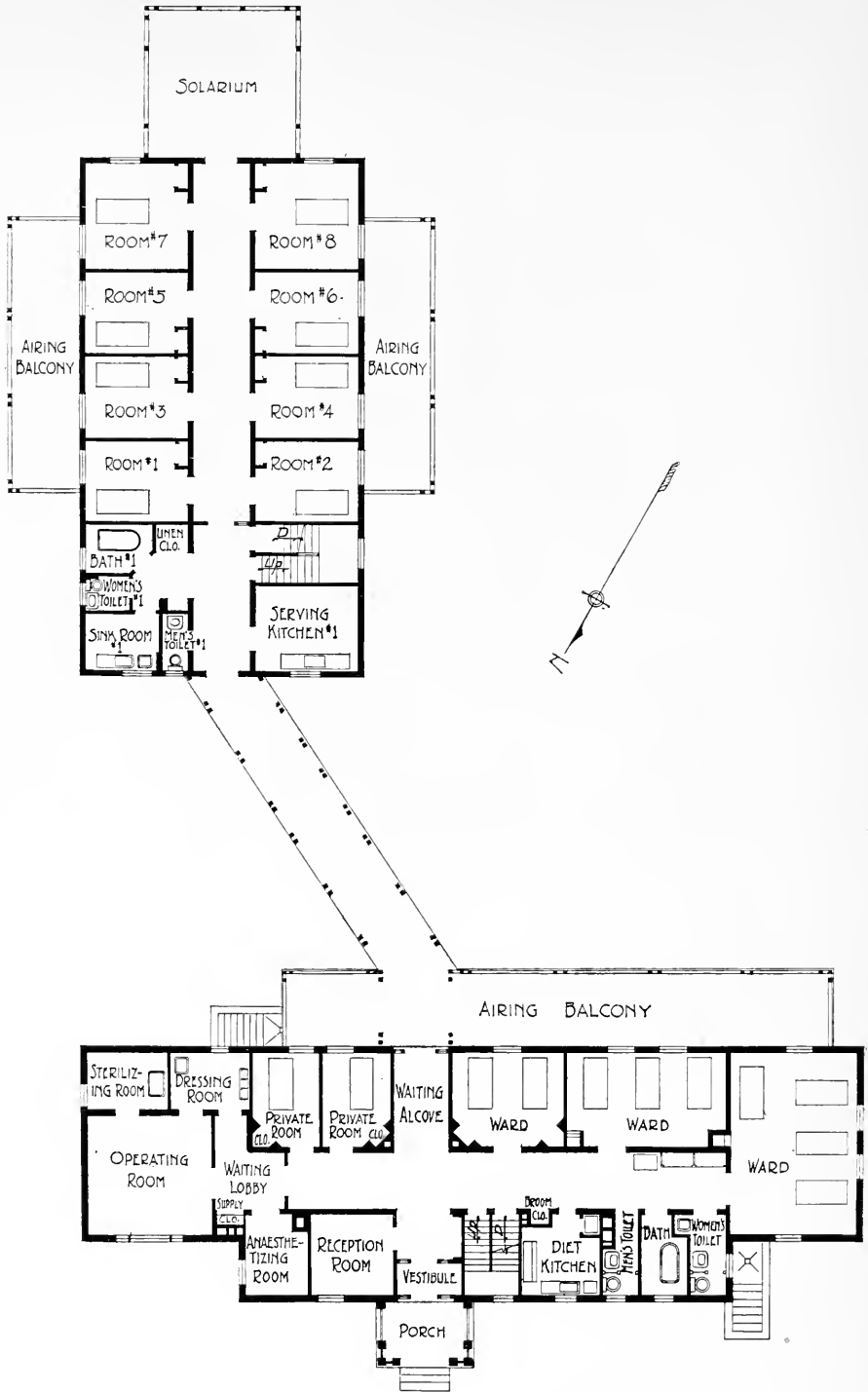


FIG. 238. DEACONESS HOSPITAL, CONCORD, MASS.
Edward F. Stevens, Architect.

On the main floor with the operating room are eight private rooms and a three-bed ward; also the necessary utility rooms. All rooms occupied by patients are located on the south and west. An airing balcony of sufficient size to accommodate all patients is placed on each story, on the southeast side of the building.

The nurses are accommodated in a separate building nearby.

This is a complete hospital of seventeen beds, which cost less than twenty-five thousand dollars, with all modern details, ready for furnishing.

A unique problem presented itself in planning the little hospital for the *New England Deaconess Association*, in Concord, Mass. (Fig. 238). Only ten or twelve beds were wanted, but sufficient accommodation was demanded of the kitchen for summer tent work, and an additional private ward which was added two years later.

The site is almost ideal, being on a slight eminence, with a level plateau stretching to the south, pine trees at the back, and an extended view of river and hills.

The first floor of the original or north building constituted the hospital. The front is north, and, therefore, is taken

up with the combination reception room and office, and with the utilities. In the eastern extension, shut off from the main hospital, is the operating suite, consisting of operating room, sterilizing room, anaesthetizing room, and surgeons' scrub-up room. The south and west sides are devoted to the rooms of patients. An airing balcony extends the entire width of the south front, and every ward and private room opens directly upon the balcony. There is an incline from the balcony to the ground so that patients may be wheeled down; easy service to the tent wards is thus secured. There were two private rooms, now used as reception rooms, a two-bed ward, a three-bed ward, and a four-bed ward.

The basement is devoted to domestic purposes, with kitchen, nurses' dining-room, storage for supplies, heating plant, and a small hand laundry.

The second story, in the gambrel roof, provides sleeping accommodations for the superintendent, four nurses, and three servants, all in single rooms, with a pleasant sitting-room at the west.

As high pressure steam or gas was not available here, electricity was employed for the diet kitchen and for sterilizing.

The original hospital building is fire-

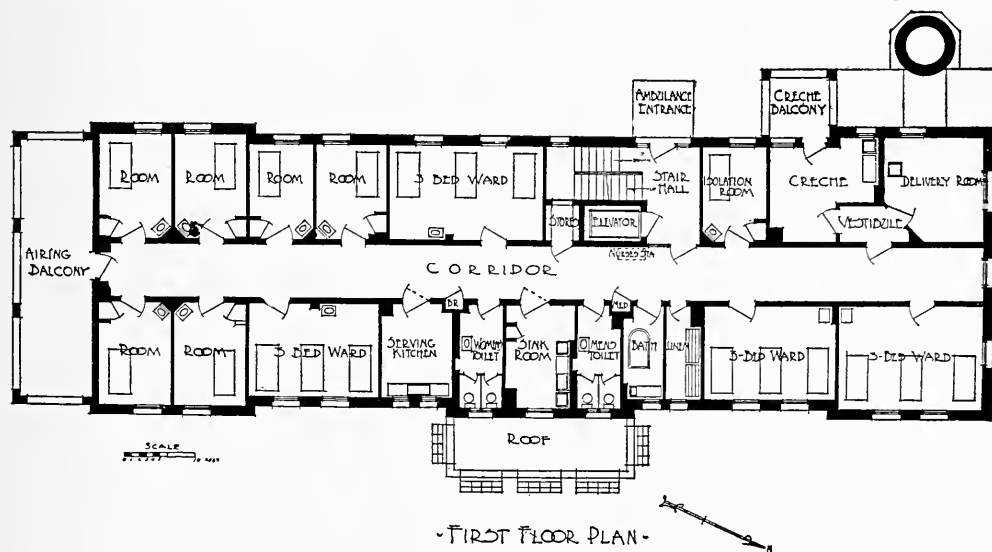
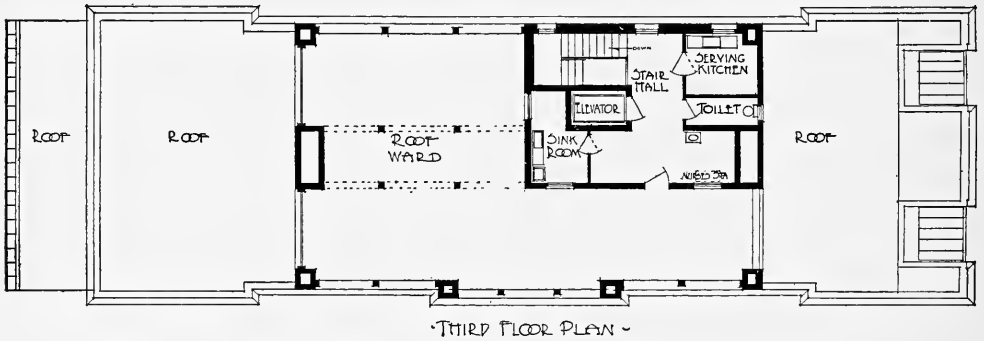
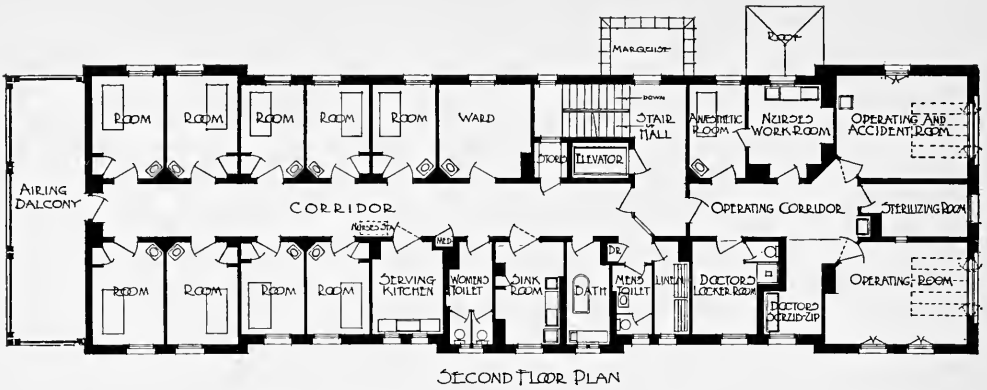


FIG. 239. BARRE (VERMONT) CITY HOSPITAL.
Edward F. Stevens, Architect.



FIGS. 240 AND 241. FLOOR PLANS—BARRE (VERMONT) CITY HOSPITAL.
Edward F. Stevens, Architect.

proof and cost, ready for occupancy, less than twenty thousand dollars.

The small private pavilion, accommodating eight private patients, relieves the original building and affords room for the increasing demand.

The second story of the new wing, also fireproof, occupied temporarily by nurses, is so constructed that with slight alterations the private service can be increased to sixteen beds.

A small city hospital, where the ground is more or less restricted, certainly should consider only fireproof structure.

The *Barre (Vt.) City Hospital* (Figs. 239-243) is another solution of the small hospital problem. Located on one of the hills overlooking the city and taking advantage of the southeasterly slope for sunlight and air, the simple brick building with its broad brick porch bids welcome to the visitor or patient.

On the entrance level or ground floor

are located the administration, the heating and kitchen departments, as well as the Roentgen-ray and laboratory departments; and, with the easterly side wholly above ground, light and air are not sacrificed.

The grade permits entrance to the first floor on the westerly side, where the ambulance door is located.

With all the general offices and utilities placed on the ground floor, the first and second floors are left free for the care of patients.

In planning this hospital no large wards were provided, for it was felt that a better segregation could be obtained with smaller wards. On the first floor were located four three-bed wards, seven single wards, and a small maternity department, entirely isolated, with delivery room, creche, and bathing department.

The second floor is almost wholly devoted to private patients and consists of

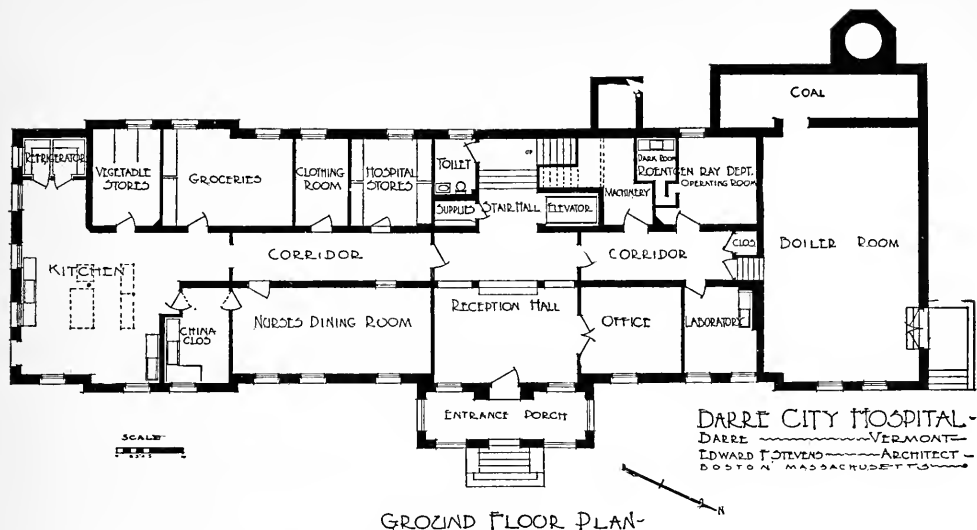


FIG. 242. BARRE (VERMONT) CITY HOSPITAL.
Edward F. Stevens, Architect.

one four-bed children's ward and nine private wards. A complete operating department is also provided on this floor, composed of two operating rooms, anæsthetic room, nurses' work room, sterilizing room and surgeons' locker rooms, all shut off from the patients' quarters and planned for the most efficient service.

On each floor ample serving kitchens,

sink rooms, bath and toilet rooms, linen storage closets, medicine closets, and nurses' stations are provided.

Large airing balconies at the south afford opportunities for patients to be wheeled into the open air. All doors are wide enough for beds, and all beds are provided with trucks, while the elevator connects all floors.

Perhaps the most interesting feature



FIG. 243. VIEW OF EXTERIOR—BARRE (VERMONT) CITY HOSPITAL.
Edward F. Stevens, Architect.

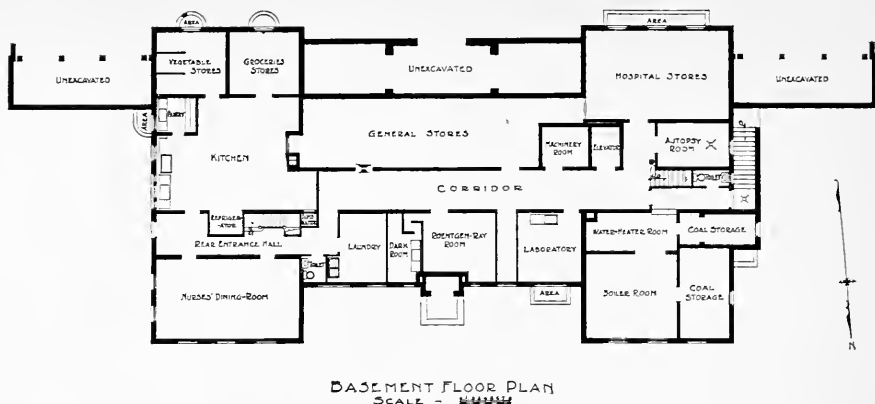


FIG. 244. BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL.

of this thirty-two-bed hospital is the extensive roof ward, equipped with all the conveniences and accessories of indoor wards and commanding a wonderful view over the city and the adjoining hills.

The materials of construction are common brick, granite and terra cotta, with floor construction of iron and concrete; the interior walls of hollow tile; the finished flooring is of terrazzo, cement, and linoleum; the finish is simple, the windows wide, and the coloring of the inside cheerful and attractive. The equipment is simple, but fulfills every requirement of modern science.

Differing from the last example, where the grounds were more or less restricted, the *Benjamin Stickney Cable Memorial Hospital* (Figs. 244-247) in Ipswich, Mass., is erected in the center of a ten-acre lot. (See Chapter XVIII on landscape architecture.) The ample space around the building, coupled with the natural beauty of the site, gives the architect more than usual opportunities for placing the rooms to the best advantage. The building faces the north, or toward the town proper, but practically all the rooms for patients are on the south, overlooking the beautiful valleys and hills in that direction.

The building, of fireproof materials, is designed in the early Georgian style so common in the old New England towns. It accommodates twenty patients on the first floor, and the second floor is also available for use of patients.

The ground floor contains the kitchen,

dining-rooms, X-ray, morgue, heating, and storage rooms; for the present, the second story is set apart for nurses and for a small isolation department.

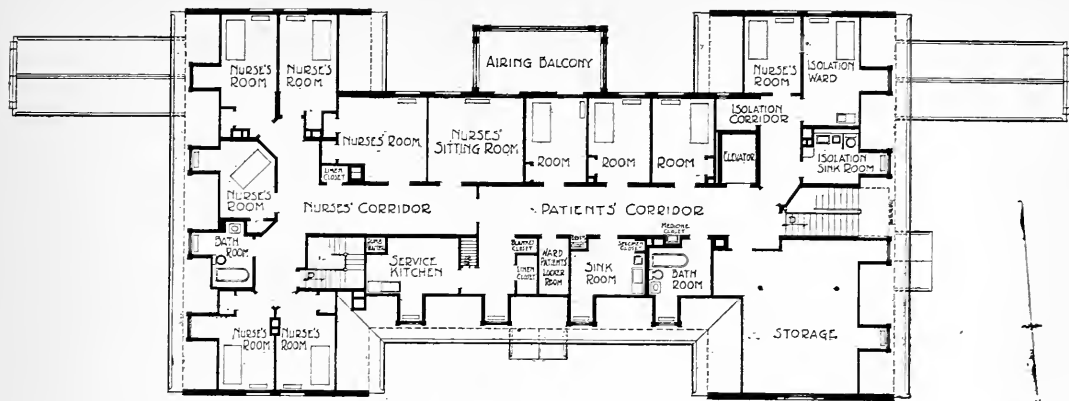
To give assurance of security, a low brick wall is built around the patients' court, upon which three airing balconies open. These airing balconies, projecting to the east and west, cut off the cold winds from the north and east.

The plan is simple: one enters through the memorial entrance, which is finished in Colonial detail, passes up two steps to the main corridor and thence into the private patients' day room, or out into the patients' court.

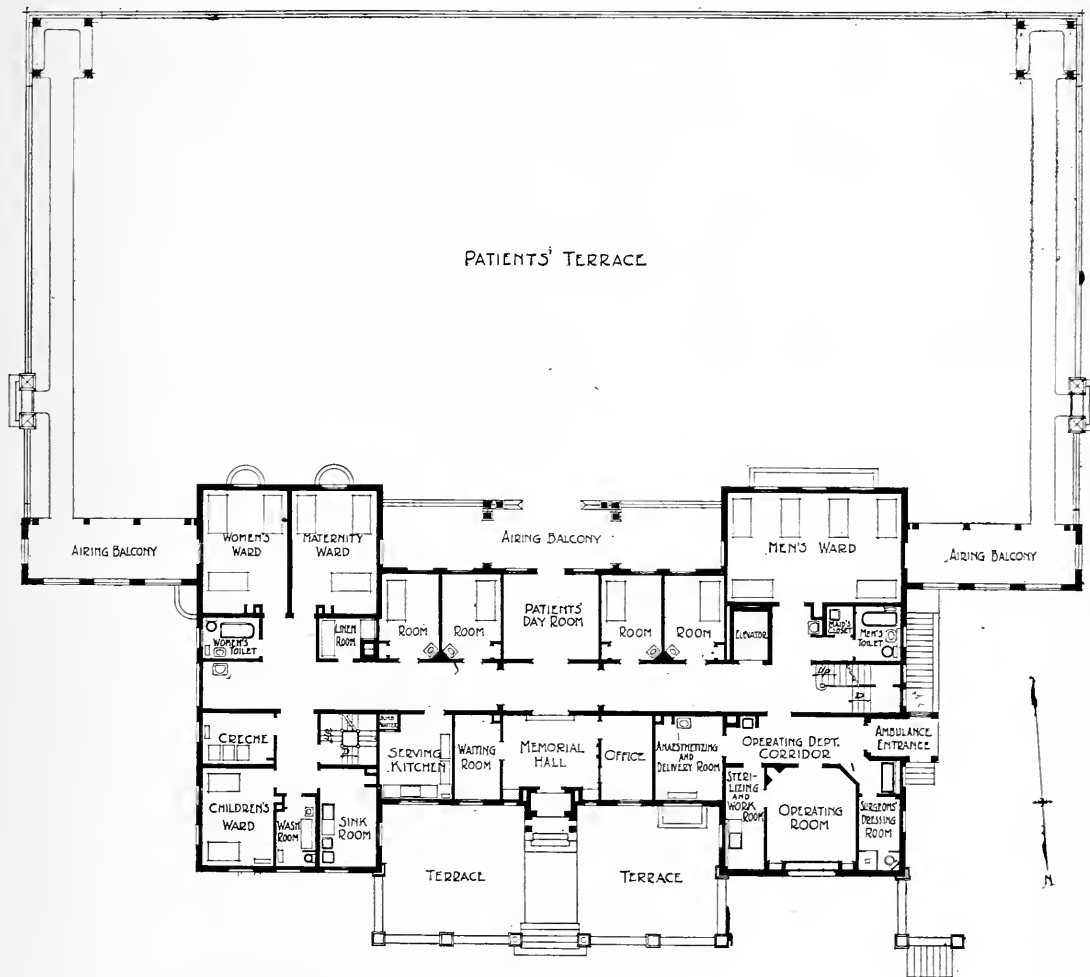
On the east end of the building is located the men's ward, the operating department, and the ambulance entrance; on the west, the women's and maternity wards; on the northeast, the children's ward; on the south are four private rooms; and on the north the utilities.

The small *Greenville Hospital* (Figs. 248 and 249) at Greenville, Me., built to meet the needs of the lumber industries of the vicinity, at the figure, approximately, of twenty-five thousand dollars, is, perhaps, as complete as any hospital of a like cost. It is somewhat unduly expensive, but was built in the season of 1916-1917 when all materials were at a maximum.

The problem on the *Melrose Hospital* (Figs. 250-257) at Melrose, Mass., was to build a fifty- to sixty-bed hospital on a noisy street corner, with trolley lines on two streets.



SECOND FLOOR PLAN.

FIRST FLOOR PLAN
SCALE 1/8" = 1'-0"FIGS. 245 AND 246. BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL, IPSWICH, MASS.
Edward F. Stevens, Architect.

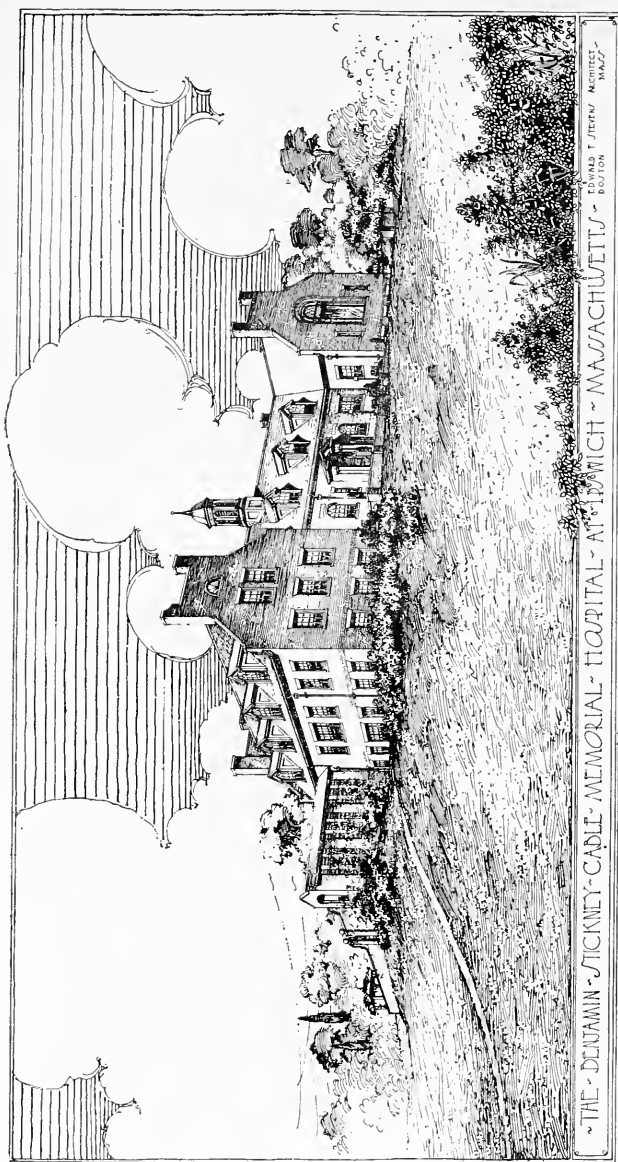


FIG. 247.

The buildings were set well back from the street, the operating portion only being near the street, the buildings being so planned as to bring the patients away from the noisy corner. There are three buildings in this group.

In the basement of the *administration building* are the Roentgen-ray and laboratory departments, the pharmacy,

store rooms, autopsy and lecture rooms, and rooms for male help. On the first floor are all of the administrative offices, the superintendent's suite, and the operating department.

The second floor, however, is devoted to the care of patients—1st, in private rooms and suites; and 2d, in the maternity department, which consists of a

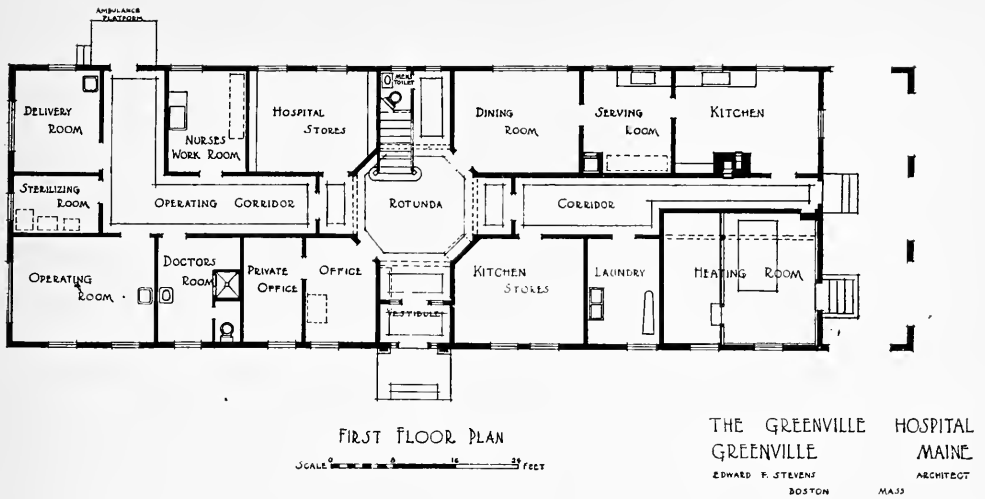


FIG. 248.

three-bed ward, a delivery room, creche, and wash room—all isolated from the other portions of the hospital.

One serving kitchen serves all patients in this building.

The *ward pavilion* is joined to the administration building by a well-lighted corridor. On the first floor are the three main wards—men's, women's and children's—and five private rooms, and on the second floor are ten private rooms, with the usual service.

All of the wards and private rooms

on the first floor open directly onto airing balconies, which are so separated that the patients on one balcony are not visible to those on another.

On the second story a large roof ward has been provided for the treatment of pneumonia cases, as well as for use by ambulatory cases.

The *heating plant* and *laundry* are housed in a separate building, which also affords sleeping accommodations for female servants. The nurses are provided for in an adjoining estate.

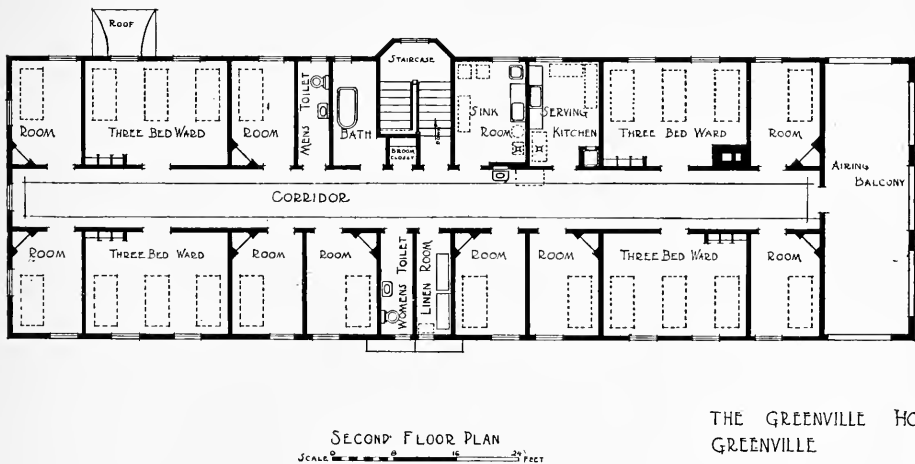


FIG. 249.

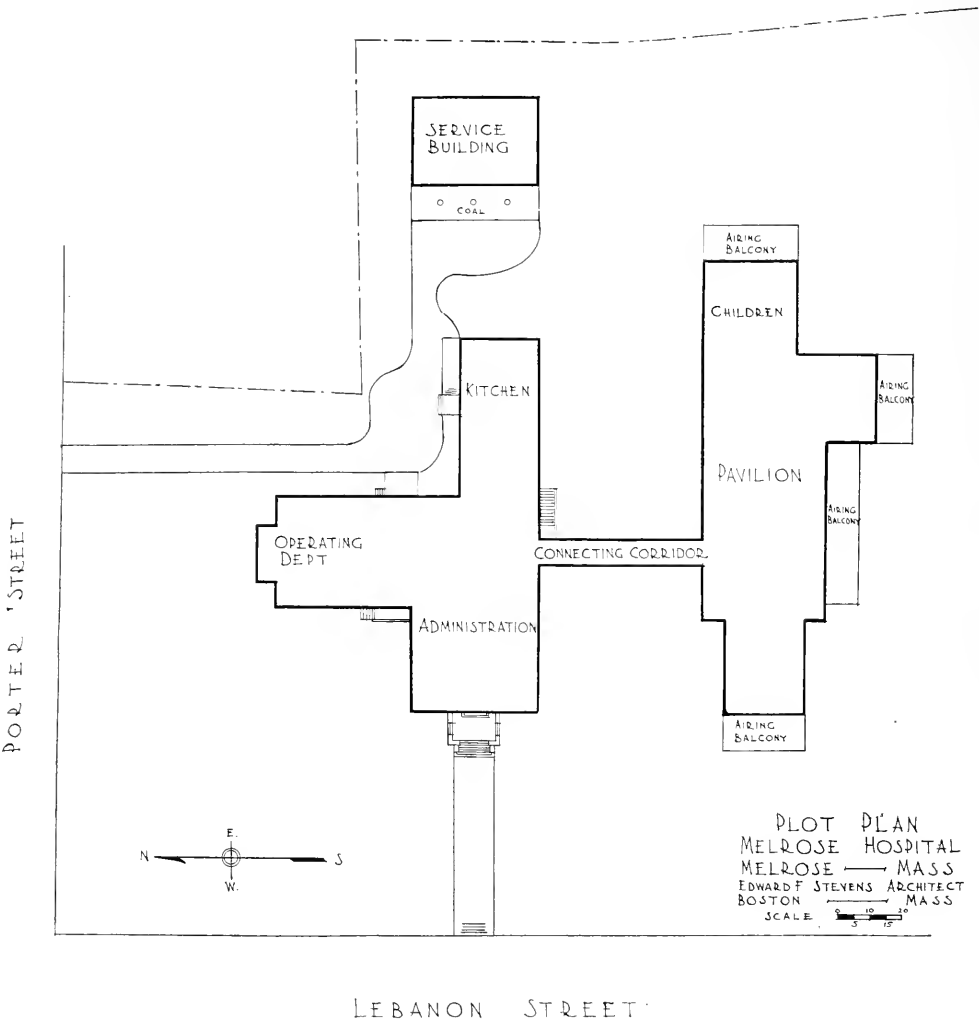


FIG. 250.

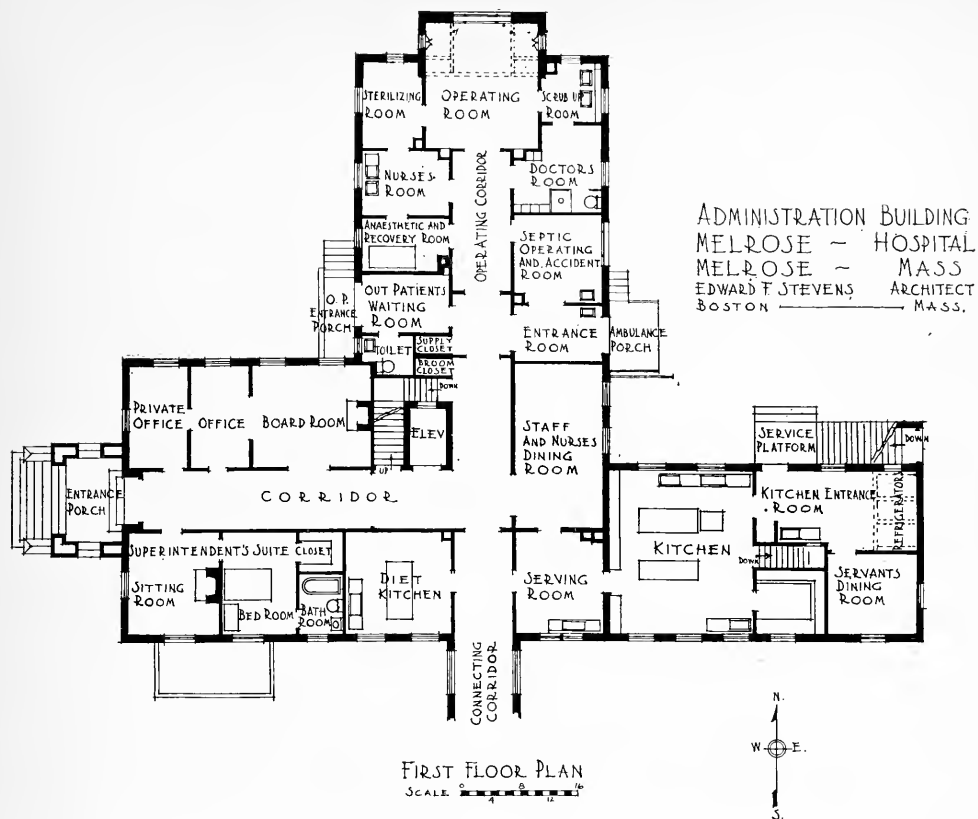


FIG. 251.

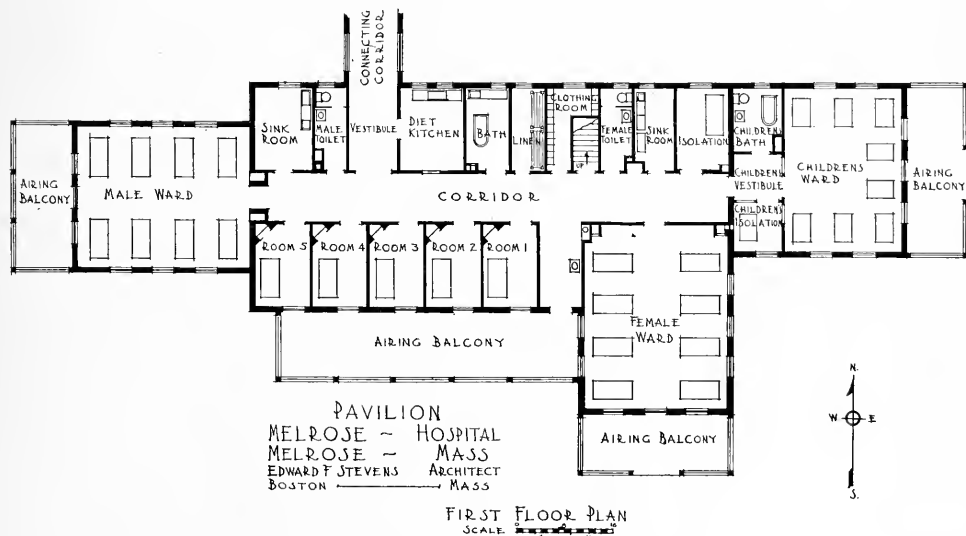


FIG. 253.

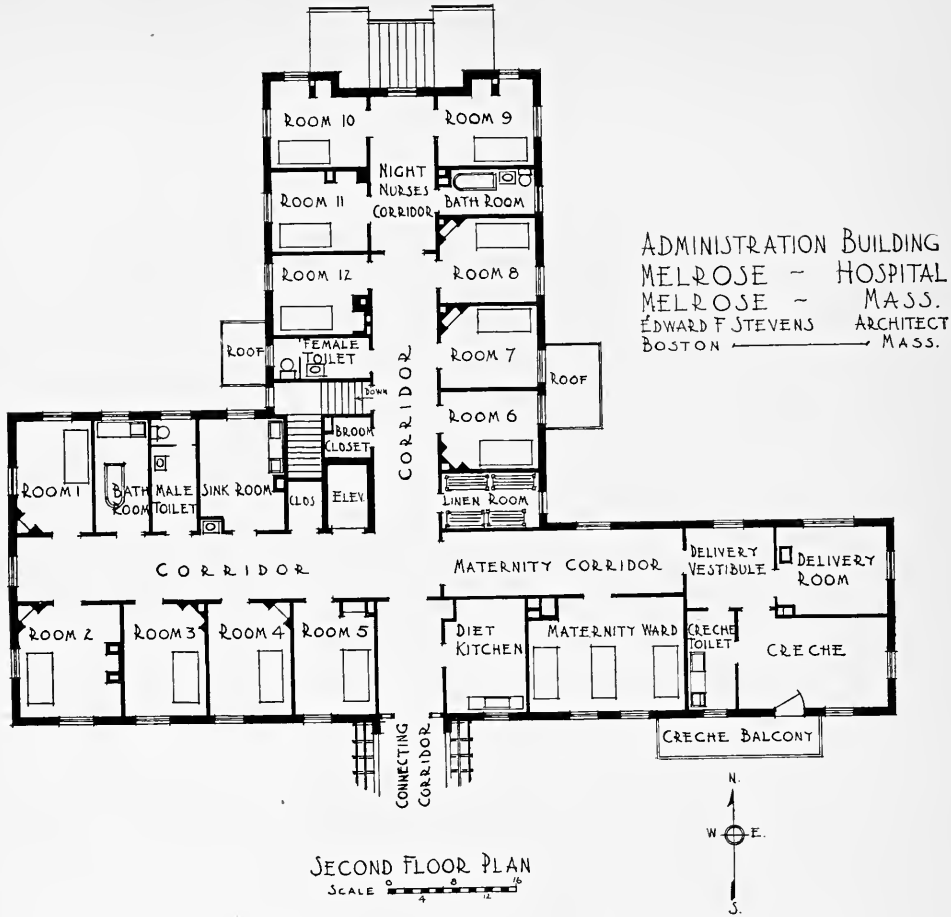


FIG. 252.

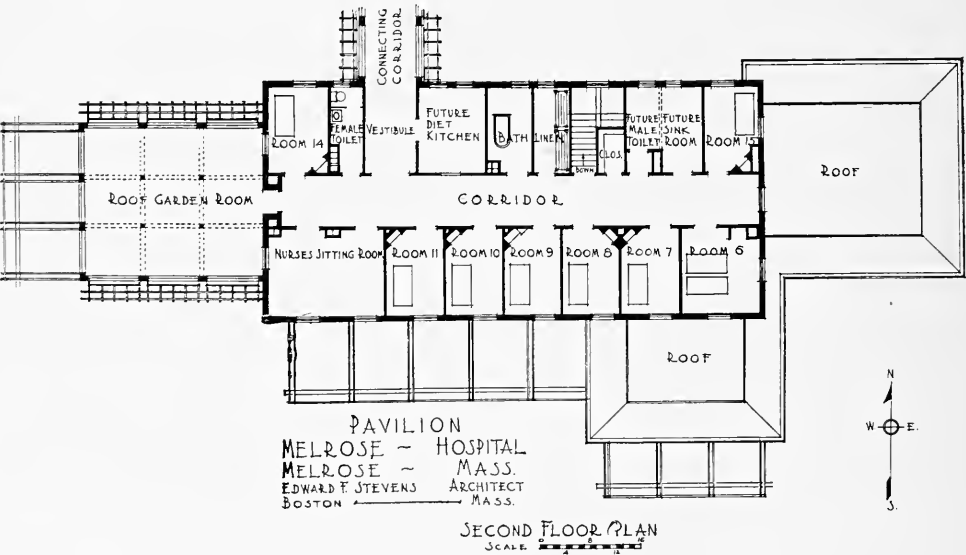


FIG. 254.

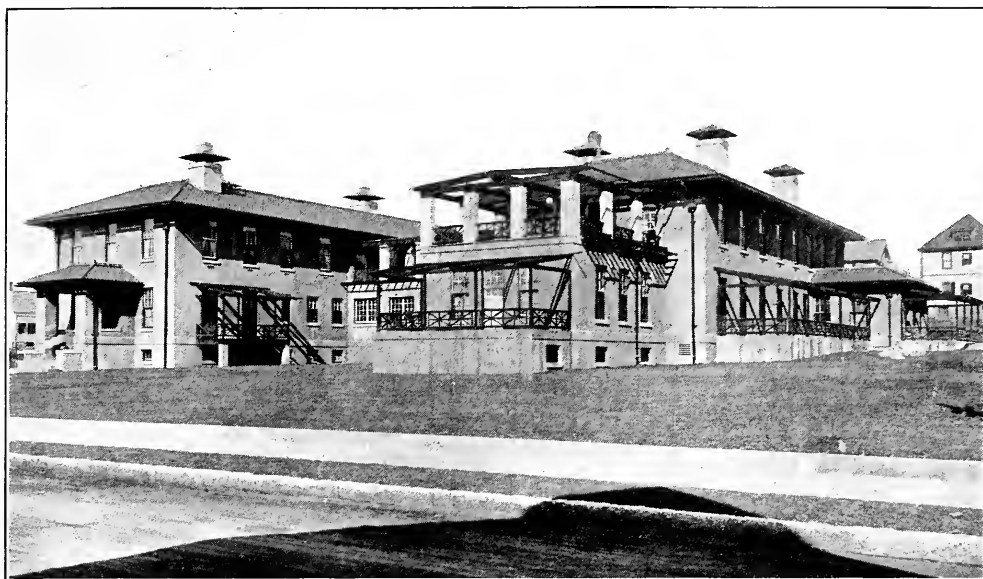


FIG. 255. MELROSE HOSPITAL, MELROSE, MASS. EXTERIOR VIEW.
Edward F. Stevens, Architect.



FIG. 256. MELROSE HOSPITAL. OPEN AIR CORRIDOR.
Edward F. Stevens, Architect.



FIG. 257. MELROSE HOSPITAL. PRIVATE WARD.

THE JOSIAH B. THOMAS HOSPITAL.
PEABODY, MASSACHUSETTS.
RENDALL TAYLOR & STEVENS ARCHITECTS: BOSTON;
EDWARD F. STEVENS.

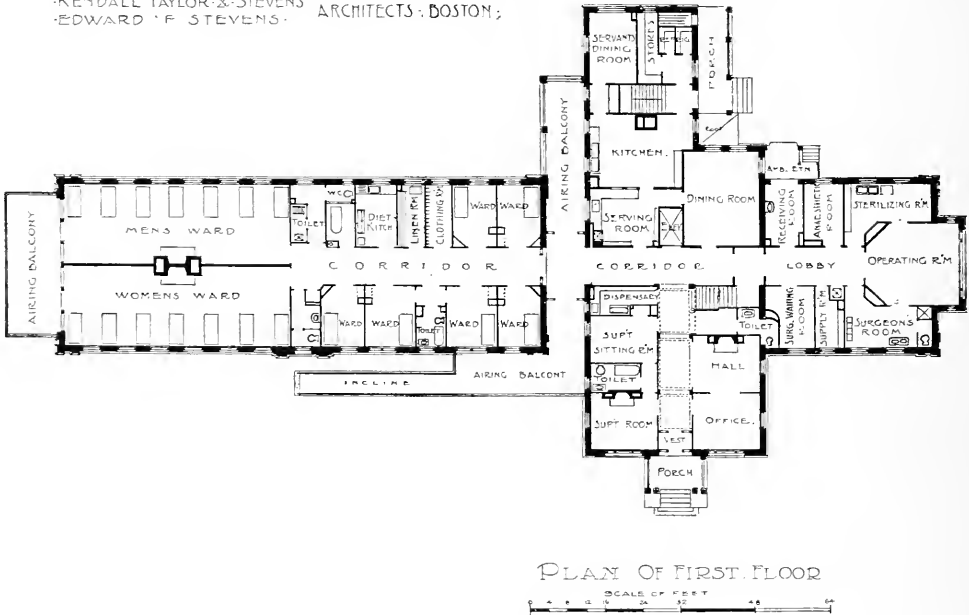


FIG. 258.

The problem of the *Josiah B. Thomas Hospital* (Figs. 258-260) at Peabody, Mass., was different. The land sloped to the north, making that exposure the important one to study. The operating room window was made the archi-

tectural feature. Otherwise the building is a simple treatment of the small hospital problem. A very complete outpatient department was secured under the surgical end of the building.

As in the case of Dr. Williams' Sana-

THE JOSIAH B. THOMAS HOSPITAL
PEABODY, MASSACHUSETTS.
KENDALL-TAYLOR & STEVENS ARCHITECTS BOSTON
EDWARD F. STEVENS

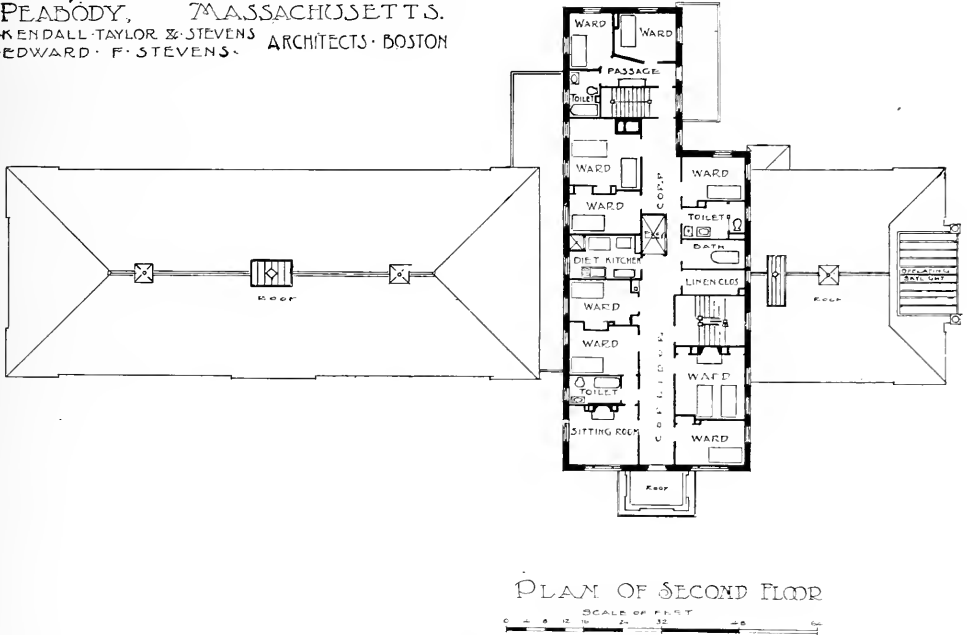


FIG. 259.

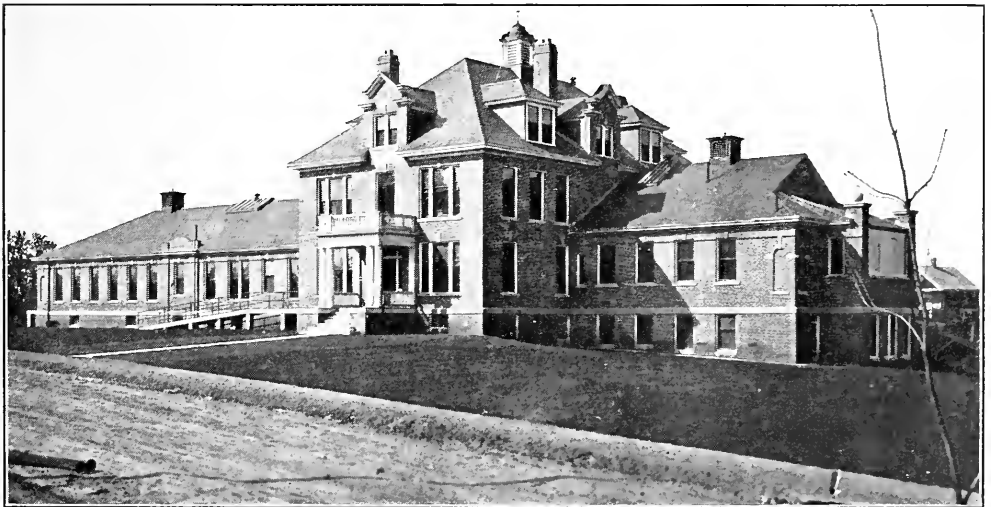


FIG. 260. JOSIAH B. THOMAS HOSPITAL, PEABODY, MASS.
Kendall, Taylor & Stevens and Edward F. Stevens, Architects.

tarium at Macon, the *Mason Hospital* (Figs. 261-265) at Clarksburg, W. Va., is mainly for the private practice of the founder.

The hospital is built on a somewhat restricted site.

The plans are self-explanatory. Provision is made for a rather extensive out-patient department in connection

with the X-ray and laboratory. The operating department is set apart from the administration, and is reached either from the ambulance entrance at the rear or through the main entrance at the front.

This small fireproof hospital is self-contained, housing all departments except the nurses.

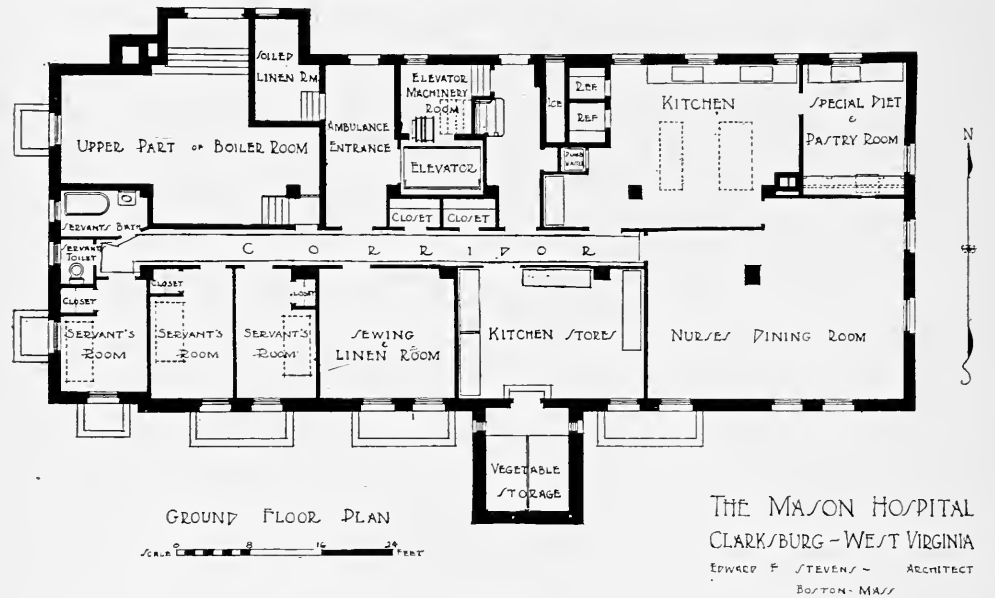
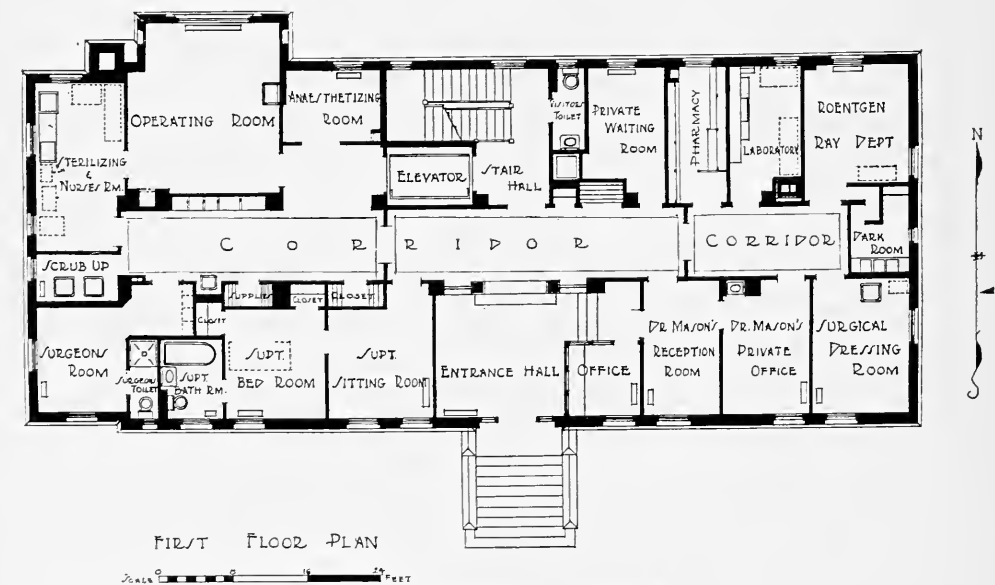
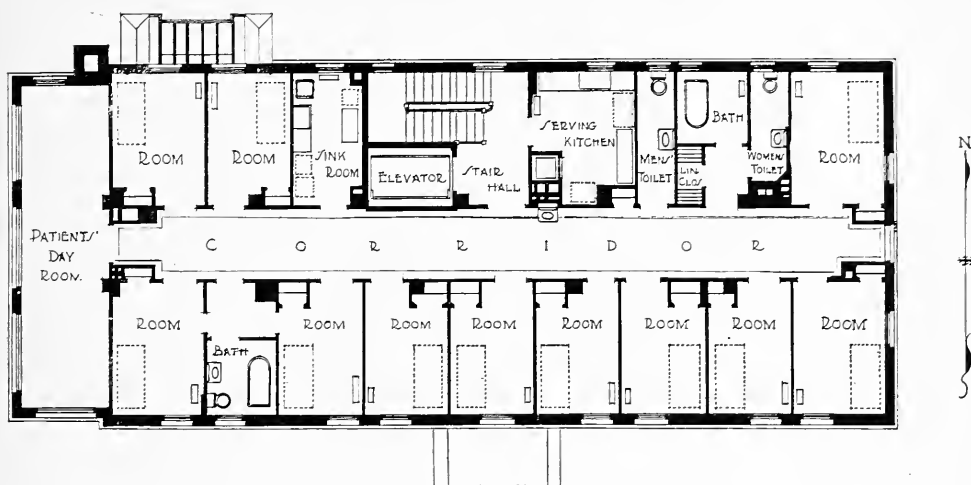


FIG. 261.



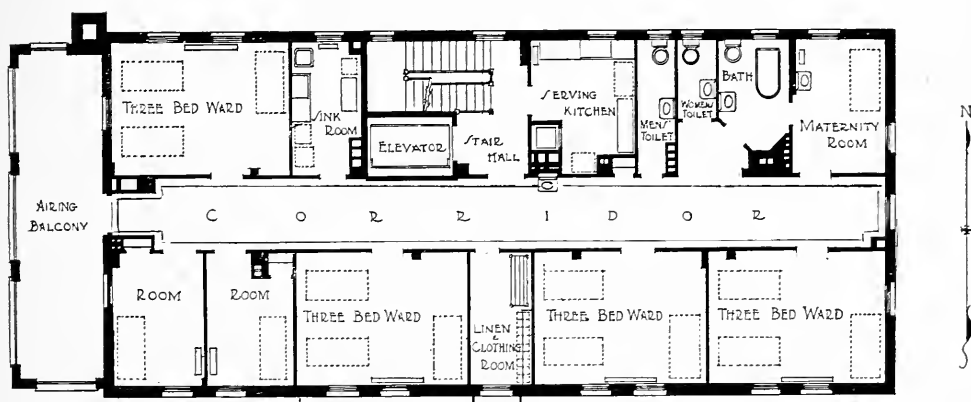


SECOND & THIRD FLOOR PLANS

SCALE 0 8 16 24 FEET

THE MASON HOSPITAL
CLARKBURG - WEST VIRGINIAEDWARD F. STEVENS - ARCHITECT
BOSTON - MASS.

FIG. 263.



FOURTH FLOOR PLAN

SCALE 0 8 16 24 FEET

THE MASON HOSPITAL
CLARKBURG - WEST VIRGINIA

EDWARD F. STEVENS - ARCHITECT

FIG. 264.



FIG. 265.

CHAPTER XIII.

The Nurses' Residence

Perhaps next in importance to the care of the patient is the care of the nurse, for to do her best and give comfort and help to the sick a nurse must conserve her own health and strength. When off duty she must be able to go out of the environment of the sick room, out of the sound of suffering, out of the smell of iodoform, and in fact out of the hospital atmosphere.

Any hospital of considerable size should have its nurses' residence. This should be a *separate building*, not too remote from the hospital, but far enough

away so that the noises of an entertainment, a dancing party or a romp will not disturb the patients.

The more attractive and homelike this building can be made and the more alluring it can be made to the young woman who is taking up nursing, the better will be the class of women who will come to it and, in the end, the better will be the care that the patient will receive.

No matter how small the appropriation for a nurses' home, one should plan for nothing but single rooms. The nurse's work on duty is most exacting, and every

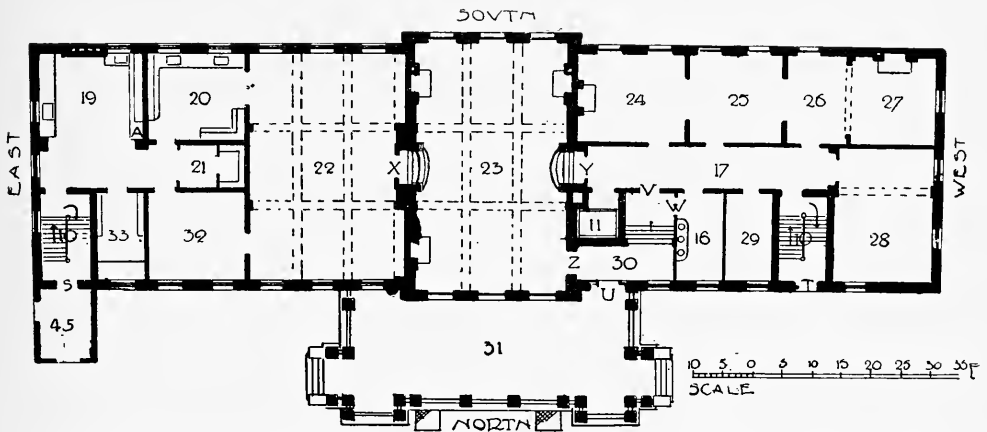


FIG. 270. HOSPITAL FOR SICK CHILDREN. NURSES' RESIDENCE. GROUND FLOOR.

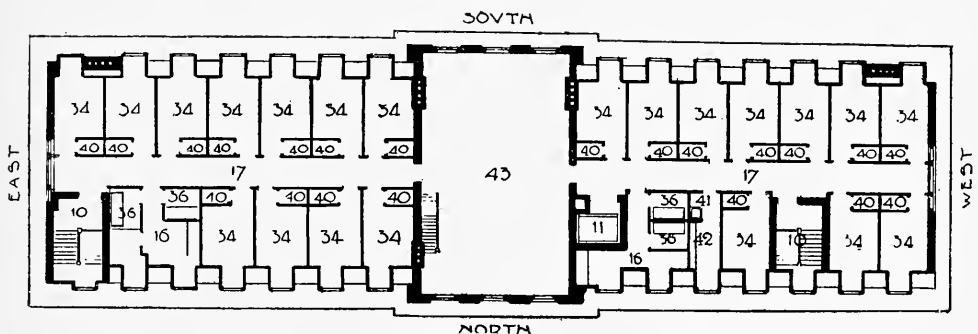
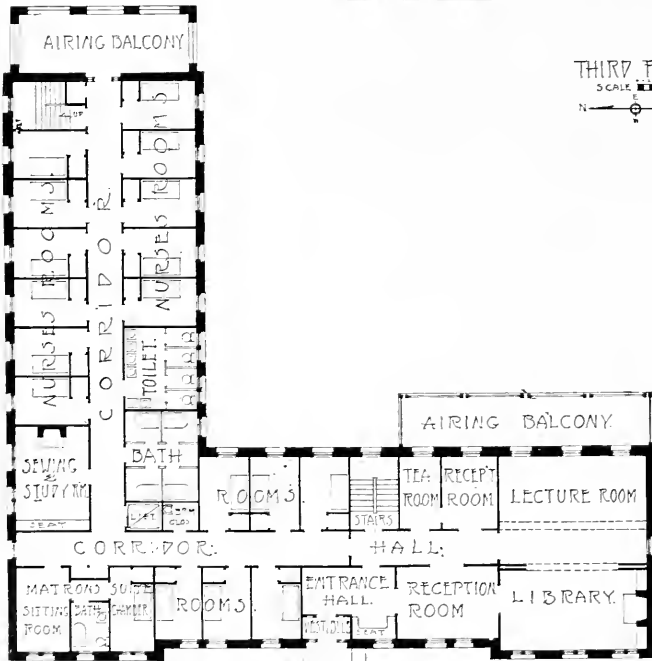


FIG. 271. HOSPITAL FOR SICK CHILDREN. NURSES' RESIDENCE. FIRST FLOOR.

NURSES RESIDENCE
BRIDGEPORT HOSPITAL
BRIDGEPORT CONN.
EDWARD F STEVENS ARCHITECT
BOSTON. MASS.



THIRD FLOOR PLAN
SCALE 0 1 2 3 4 5 FEET
N
↑
S



FIRST FLOOR PLAN
SCALE 0 1 2 3 4 5 FEET
N
↑
S

FIG. 273.

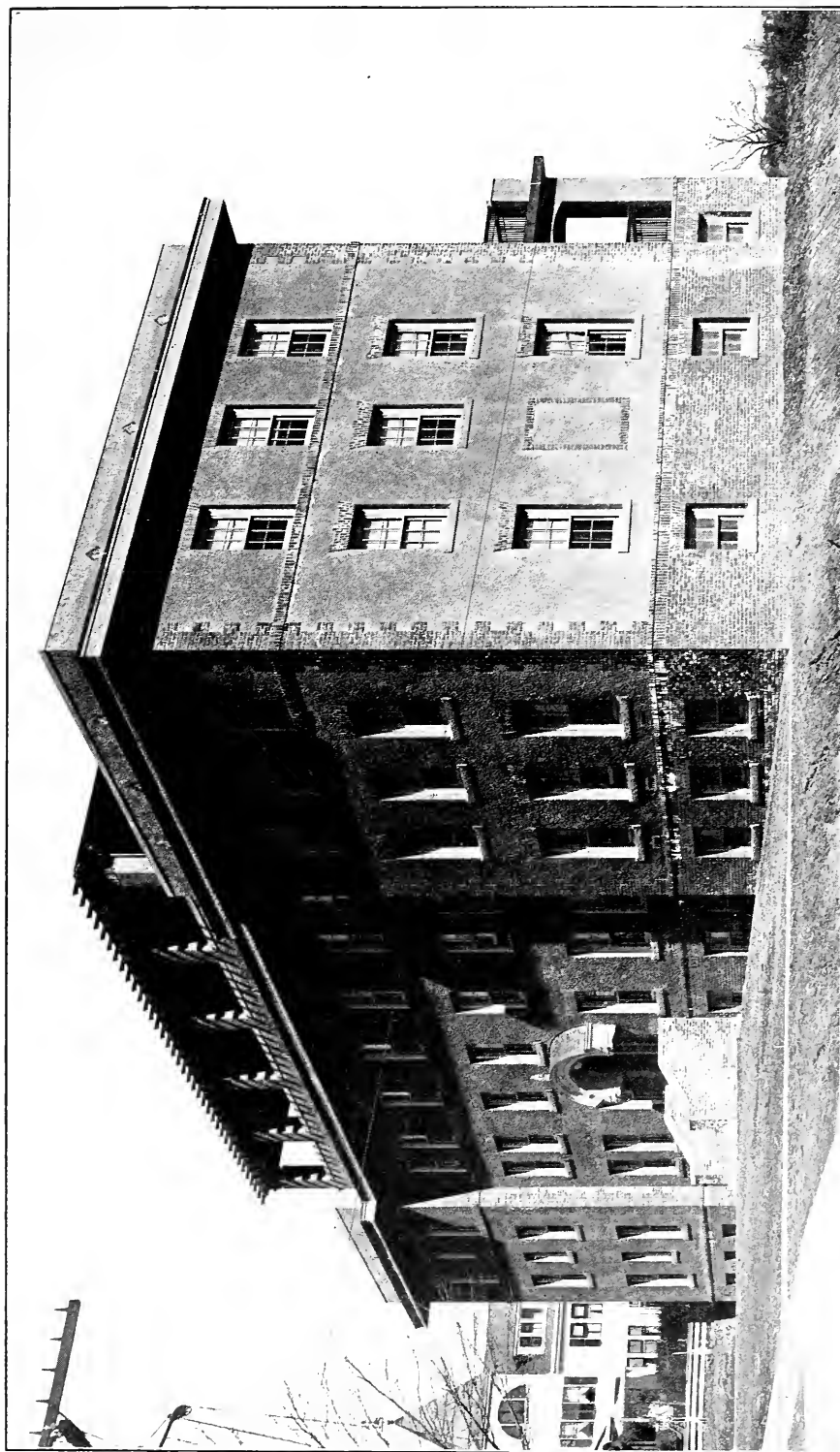


FIG. 275. BRIDGEPORT HOSPITAL. NURSES' RESIDENCE.
Edward F. Stevens, Architect.



FIG. 276. BRIDGEPORT HOSPITAL. NURSES' RESIDENCE. VIEW FROM REAR.



FIG. 277. BRIDGEPORT HOSPITAL. NURSES' RESIDENCE. STUDY ROOM.



FIG. 278. BRIDGEPORT HOSPITAL. NURSES' RESIDENCE. ROOM OF SUPERINTENDENT OF NURSES.

nurse, whether pupil or graduate, should have her *own separate room*. It need not be large, only enough for a single bed, closet, dresser, and study desk. These can be fitted into an area 8'-6" by 12'-0". The closet should be large and, if possible, lighted by a window. An adjustable electric drop light can be made to serve both for study and toilet light. This is the minimum amount of light, and of course can be increased to any extent.

The living room should be homelike and refined. It should have fireplace, settle seats, and cozy corners. There should be a number of reception rooms where the nurses may meet their friends, and a sitting or study room on each floor.

There should be a small tea kitchen with gas stove and other conveniences, where the nurses may prepare an occasional "spread" for the refreshments of an evening party.

A large trunk room is necessary, with easily accessible racks for trunks. A petty laundry, equipped with set tubs and ironing boards, should be provided in the basement.

Class rooms for demonstration and class work should be planned for in a well-lighted section of the building. These class rooms should be well equipped for demonstration in all kinds of hospital technique.

In the smaller hospitals, a portion of the nurses' residence is sometimes set apart for the housing of servants. The same general conditions should exist for servants as for nurses, but some of the refinements need not be furnished, although a separate room for each individual should be provided. Of course, where the size of the institution warrants, there should be a separate home.

The same conditions apply to internes' and orderlies' quarters. The internes,



FIG. 279. BRIDGEPORT HOSPITAL. NURSES' RESIDENCE. TYPICAL NURSE'S ROOM.



FIG. 280. ST. LUKE'S HOSPITAL, JACKSONVILLE. NURSES' RESIDENCE. FLOOR PLANS.



FIG. 281. ST. LUKE'S HOSPITAL, JACKSONVILLE, FLORIDA. NURSES' RESIDENCE.

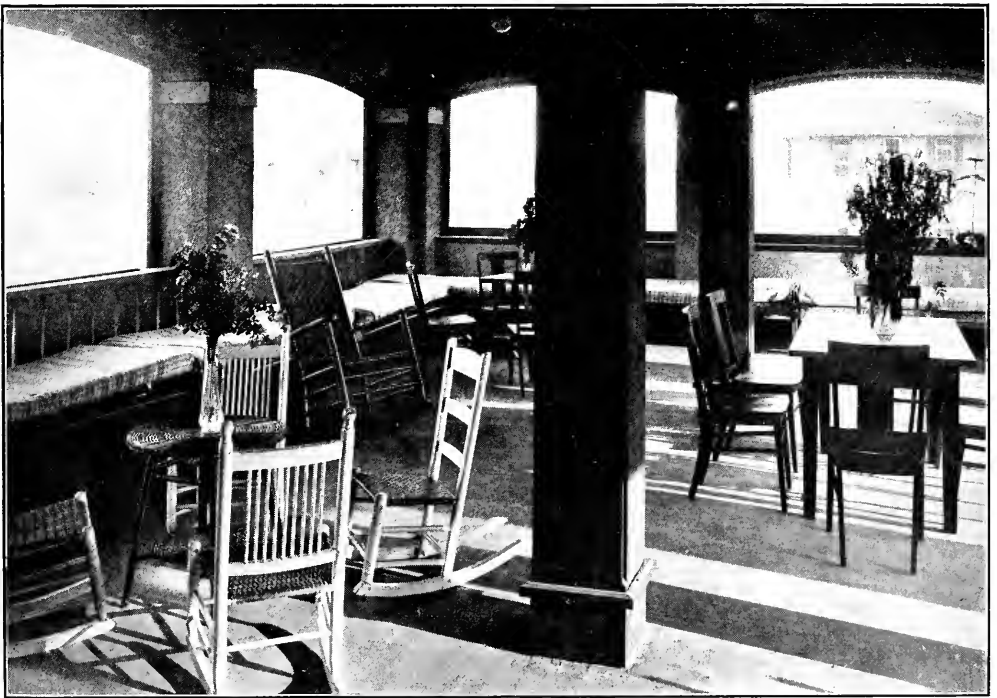


FIG. 282. ST. LUKE'S HOSPITAL, JACKSONVILLE. NURSES' RESIDENCE. VIEW IN SLEEPING PORCH.

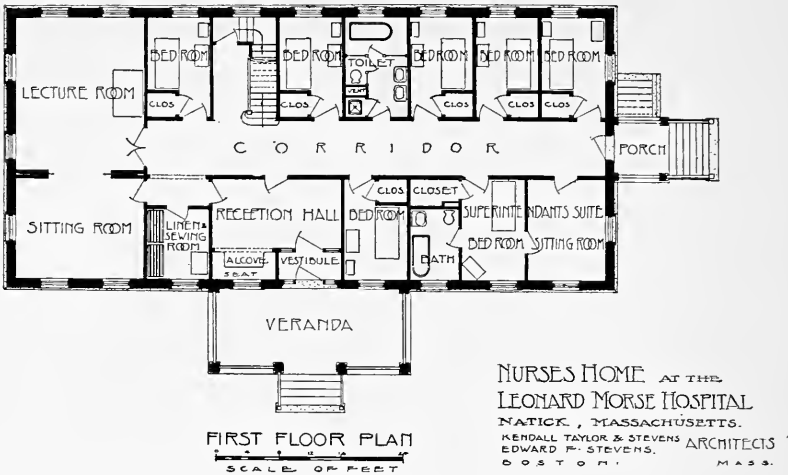


FIG. 283.

who are college men accustomed to refinement, should have comfortable quarters, sufficiently removed from the patients not to disturb or be disturbed.

There must be ample toilet facilities on each floor—one tub and one water-closet for each five or six nurses, one wash basin to every four. There should be both shower and tub baths. If possible, bowls with hot and cold water should be placed in every room. There should be a slop sink and broom closet on each floor.

Space should be set aside for nurses

on night duty, preferably in the upper story, away from the noise. These rooms should be on a separate corridor.

An infirmary for sick nurses, fitted as a hospital unit, should be provided in every large home.

There should be a piazza and balconies wherever space and money will permit, preferably on the sunny side. If the roof be flat, arrangement should be made to use it for outdoor sleeping as well as for recreation.

In the larger homes for nurses, it may be desirable to provide a separate kit-

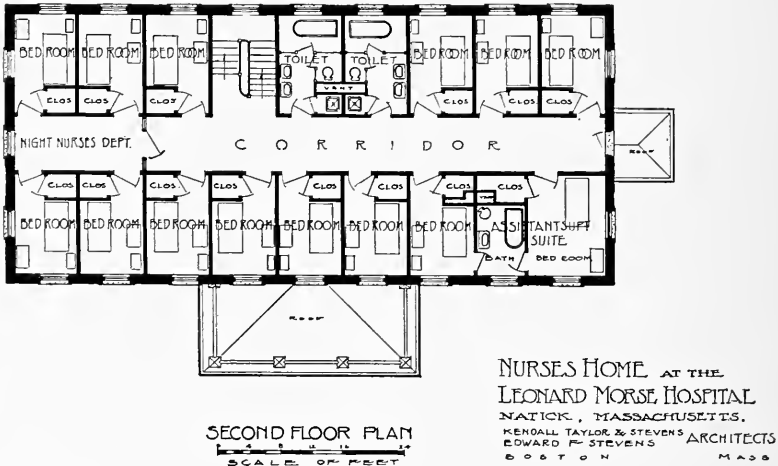
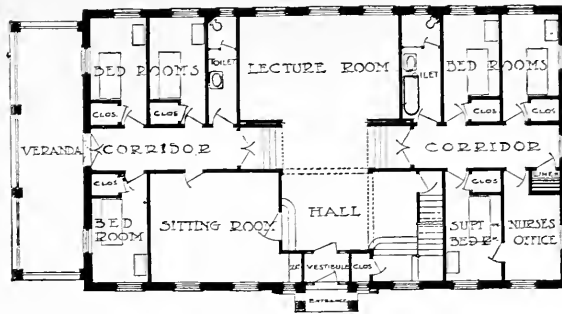


FIG. 284.



FIRST FLOOR PLAN
SCALE OF FEET

J. MANCHESTER HAYNES HOME FOR NURSES.
ANGUSTA CITY HOSPITAL, ANGUSTA, ME.
KENDALL, TAYLOR & STEVENS. EDWARD F. STEVENS.
ARCHITECTS BOSTON

FIG. 285.

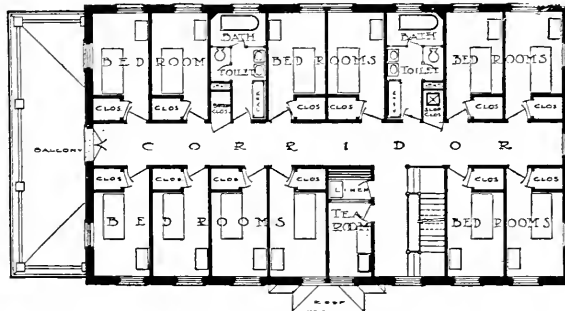
chen and dining-room in the building. In small institutions it is more economical to place the nurses' dining-room near the main hospital kitchen.

Dr. Donald Mackintosh,* in writing on hospital construction, places the nurses' residence of *Hospital for Sick Children* (Figs. 270-272), as the best example of convenience, and the plans are reproduced here. It is certainly a model home, with its great reception hall, dining-rooms and kitchen, its swimming pool and gymnasium, its sitting and study rooms, etc.

*"Construction, Equipment and Management of a General Hospital." Published by Wm. Hodge & Co., Glasgow.

The nurses' residence at the *Bridgeport (Conn.) Hospital* (Fig. 19), planned on the L-shape with provision for future extension completing the U-form, is built on the adjoining lot to the hospital.

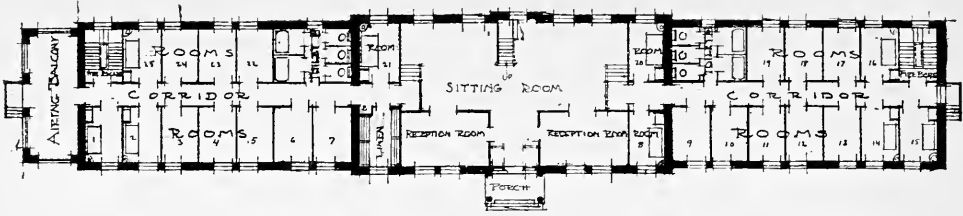
Reception rooms adjoin the entrance, and the social and lecture rooms are connected. The suite of the superintendent of nurses is at the northwest corner, and consists of two small rooms and bath. There is a study room on each floor. A small infirmary of four rooms is provided for the care of the sick nurse. The roof garden is sufficiently large for all to sleep in the open.



SECOND FLOOR PLAN
SCALE OF FEET

J. MANCHESTER HAYNES HOME FOR NURSES.
ANGUSTA CITY HOSPITAL, ANGUSTA, ME.
KENDALL, TAYLOR & STEVENS. EDWARD F. STEVENS.
ARCHITECTS BOSTON

FIG. 286.



FIRST FLOOR PLAN
SCALE 1/16" = 1'-0"

FIG. 287. PROPOSED HELP'S BUILDING.
Edward F. Stevens, Architect.

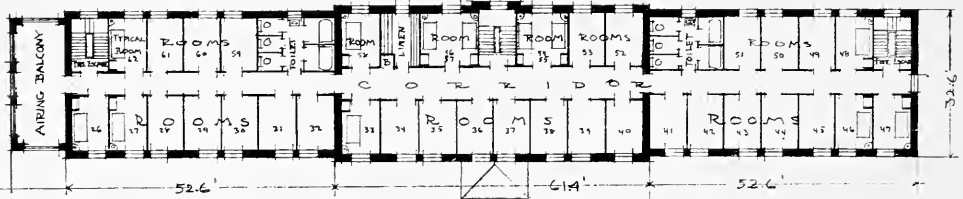
While all hospital buildings should be fireproof for the safety of the helpless patients, it is sometimes possible to give the maximum amount of convenience at a minimum cost by making this section of the institution non-fireproof. This was done in the nurses' residence of the *St. Luke's Hospital* (Fig. 280) at Jacksonville. This was built at a very low cost, owing to its simple lines, being planned on a nine-foot unit system, so that all partitions and piping came in verticals, one above the other. All the necessary rooms were provided for the comfort and pleasure of the nurses, including a broad roof balcony for sleeping. The

outer finish of this building is the same as the others of the group, which are fireproof.

The plans for the nurses' residence of the *Leonard Morse Hospital* and of the *Augusta (Me.) City Hospital* are here shown.

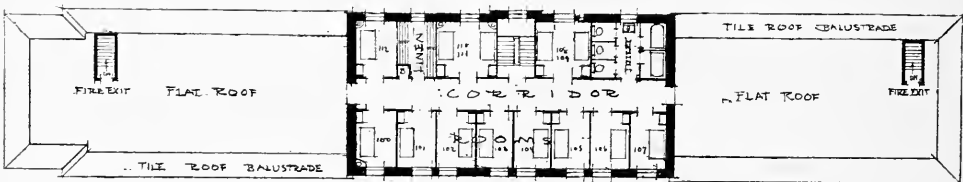
One example of *help's building* on even more economical lines is that designed for *Kings County Hospital* (Figs 287-289), New York City, Department of Charities.

This is planned on an eight-foot unit basis and has all the necessary common rooms, toilets and staircases for a building of this nature.



SECOND & THIRD FLOOR PLANS
SCALE 1/16" = 1'-0" HEIGHT 35.5'

FIG. 288. PROPOSED HELPS' BUILDING.
Edward F. Stevens, Architect.



FOURTH FLOOR PLAN
SCALE 1/16" = 1'-0"

FIG. 289. PROPOSED HELP'S BUILDING.
Edward F. Stevens, Architect.

CHAPTER XIV.

Kitchen and Laundry

The location and plan of the kitchen building, so-called, are most important factors in the success or failure of an institution. The kitchen, whether an isolated building or a department in a general building, should be so located that food—hot, palatable food—can be readily transported, with the least delay and the least amount of handling, from the place where it is cooked to the patient's tray or dining table. To do this, certain conditions must exist—

- (a) A central location,
- (b) Adequate means of transporting,
- (c) Serving kitchens of sufficient size and equipment to care for and distribute food properly.

If occupying only a portion of the building, the kitchen should be on the ground floor or on the highest floor. Many of our best hospital superintendents contend that the kitchen should be on the upper level, while others agree that, owing to a greater facility for delivery of supplies, the lower basement level is the more economical. With a refrigerating system and good elevator service, the upper level kitchen has certain advantages, the chief being the freedom from odors of cooking and the exclusion of tradesmen from the kitchen. On the other hand, the low level kitchen affords quicker delivery of supplies, quicker disposal of waste products, and, as the heavier demand is apt to be on the lower floors, quicker service to the greatest number of patients.

The kitchen should not be too large or too small. If too large, time is wasted, owing to the distance traveled; if too small, it will be too crowded to secure the best results. In other words, the kitchen should be planned to meet the needs of the institution, not forgetting, however, its probable growth.

The hospital kitchen should be plan-

ned like a modern factory—that is, to receive the raw material and to deliver the finished product (which is palatable food) with as few lost motions and delays as would be expected by a modern manufacturer in his factory. If there is any delay by the way, there is a loss in food value, and the patient has in consequence less of vital energy than with efficient service. The same thing applies not only to the patient but to the nurse, the attendant, the servant, and all along down the line. An underfed nurse or domestic cannot do her best, so that as a purely business proposition it pays to feed well everybody connected with the institution.

In the kitchen, the *building* should be planned around the *equipment*. The ranges, which are perhaps the apparatus most constantly in use, should be placed in the most convenient place—generally in the center, where all sides are available.

For fuel, circumstances differ, and what is best in one part of the country may not be good in another. Gas, either natural or artificial, in the long run is not only the most economical but the most efficient. There is no dust, no dirt, no unsightly or unsanitary coal scuttle in the way. The modern blast burner ranges give the same quality of heat as the best coal range. Broilers or toasters are equally good in gas, and these should be placed on the same line and near the range. In the institutions in the west crude oil is used both for kitchens and for heating boilers.

With electricity at a minimum cost much work can be done with that medium.

Much of the cooking formerly done on the range can now be more efficiently done by steam. In the pressure steam cooker practically all vegetables can be prepared. This cooker should be of

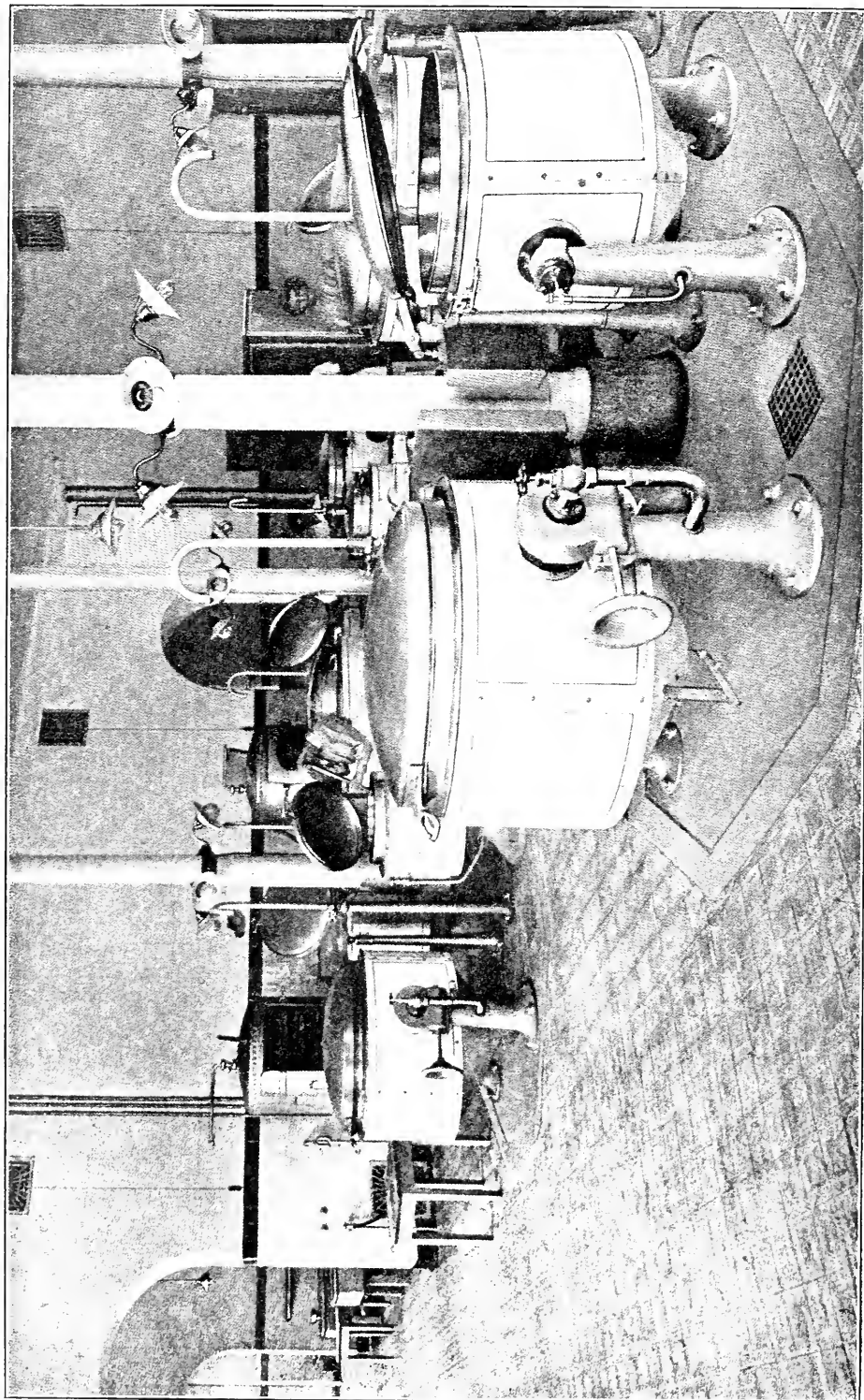


FIG. 301. RIGS HOSPITAL, COPENHAGEN. VIEW IN KITCHEN.

sufficient size and of proper design to do the work easily.

The steam stock kettles as made and used in Europe are much finer in workmanship and more attractive than those made in America. American manufacturers have not sufficiently considered the hygienic construction of many of our hospital appurtenances.

For the cooking of cereals, the tilting kettles are the simplest in action, being easily manipulated and cleaned.

All steam apparatus should be planned to withstand a pressure of at least sixty pounds per square inch. To that end, a reducing valve for the kitchen steam supply should be provided.

The kitchen sinks should be planned for their special uses—deep sinks for pots and pans, and shallow sinks for smaller utensils. Vegetable sinks can be grouped together. A small sink in the cook's table often saves steps.

The many labor-saving devices driven by the small motor, such as meat choppers, bread and cake mixers, ice-cream freezers and ice crushers, vegetable and fruit parers, make the work of preparing food vastly easier. Power dish-washers save much time and many dishes. Steam tables have become a necessity in keeping food palatable.

All cabinets and racks should be open and easy to clean. Dish cabinets and dish warmers should be at a proper height from the floor to prevent extra muscular strain in removing the dishes.

Every hospital of considerable size should have a room for the preparation of special diets. This room should be near but not a part of the kitchen. It must also be near the food lifts and the route of service. It is customary to use the diet kitchen for a teaching kitchen for the nurses in training; and where this is the case, cabinets, fitted for individual service, are sometimes provided.

The serving kitchen has a place among the important rooms of a hospital, for in this room the trays for the food are prepared, and from it the food is distributed. If the serving kitchen is conveniently arranged, the food is more likely to be brought to the patient in the

best condition. And what a difference even the looks of a tray makes to a delicate patient!

How often one hears it said about a hospital, "The operating room technique is perfect; the nursing is all that can be desired; but the food—and the service!" Good food, properly served, goes a long way toward offsetting deficiencies in other departments.

The serving kitchen should be of sufficient size to do the work properly. In one of the earlier hospitals designed by the writer, the planning of which was directed largely by the building committee, the desire on their part to make every inch available for patients made it necessary for the serving kitchen to be so reduced in size that it has always been a great drawback to the best serving of meals. A little more space devoted to this room would have added greatly to the comfort of both nurse and patient.

What are the essentials and what are the luxuries of a serving kitchen? The essentials are:

1st, Proper Location—Remember that a ward serving kitchen is a very busy place three times a day. Many utensils must be handled, washed and put away; food trucks are going and coming; so that this room should be located remotely or in such a way that the sound from the room is cut off from the patients. This may be accomplished by having the serving kitchen entered from a side corridor, as in the Melrose Hospital (Fig. 253); or through a vestibule, as at the Royal Victoria (Fig. 66); or by having it entirely apart, as at the Bridgeport Hospital (Fig. 45).

2nd, Room Enough to Lay Trays—There should be room enough, and the room should be so planned that no one will be crowded while preparing the meals. If the building is a multi-story building, special food lifts, large enough to carry a food car, should be provided, and space enough to bring the car into the room to discharge it.

In moving the food from the kitchen it should be handled as little as possible. To that end, the food truck loaded in the kitchen should not be disturbed until it reaches the serving kitchen. This food

truck can be taken on the serving elevator; or, better still, special food elevators may be provided, working automatically from the sending point on the kitchen level. These food trucks can be kept warm by electricity, hot water, or hot soapstone. The one shown in the illustration (Fig. 41) is heated by soapstone.

3rd, Keeping Food Warm or Cold—The steam-table is almost indispensable for keeping food hot, and should be provided with a gas plate and warming closet.

Tray racks of sufficient capacity for holding all trays should be provided. These racks should be mounted on ball-bearing casters, so that if required the trays can be brought *en masse* to the ward door. The use of the portable hot table is growing in popularity. For some classes of patients this makes the most satisfactory method of serving.

Refrigerators should be built or selected with care and, with due regard for hygiene, should be either porcelain or tile lined, and should have properly trapped drains. If there is a refrigerating plant, by all means extend the pipes to these small serving-kitchen refrigerators.

4th, Utensils and Their Cleaning—Among the luxuries of the serving kitchen might be counted special egg boilers, coffee percolators, individual services for private patients, special china and glass, hot plates and more attractive trays and linen.

Where the dishes from patients with infectious diseases are cared for, the dish sterilizer is absolutely essential.

The location and size of the sink is important. There should be an ample drainboard and the sink set high. The tendency of the plumber is to place the sink at *his* standard height, making everyone who uses it stoop, while placing it a few inches higher would save many a backache. The material for the sink is largely a matter of fancy. Iron, porcelain and soapstone are used.

A suitable receptacle should be provided for the dishes and utensils after they are cleaned. The cabinet should be hygienic in its construction, easily cleaned, with slanting top so that the

dust may be seen and removed. It should contain drawers and cupboards enough to store the cutlery and silver needed in the section served by ward kitchen.

In General—The room should be tiled to a height of four feet. If the expense of this is prohibitive, place tiling at least back of all plumbing fixtures.

The floors should be of a non-porous substance, like magnesite, terrazzo, or tile; if of tile, a gray or buff is much easier to care for than white.

Dining Rooms. The dining-room for nurses (if in the same building with the kitchen) should be in a well-lighted portion of the building, and some attention should be paid to the decoration and artificial illumination. A serving room, equipped with steam table and coffee urns, should be placed between kitchen and dining-room, if possible.



FIG. 302. STATE HOSPITAL, KARLSRUHE.
KITCHEN DETAIL.

It has been found in many institutions that a dining-room or restaurant for friends of the patients is not only a source of satisfaction to the friends but also a profit to the hospital.

The feeding of servants has been accomplished in an economical way in many institutions by establishing a self-serve system, where each person selects what suits him best, takes it to the table, and eats. This removes dissatisfaction on the part of the servants, facilitates the service, and reduces the number of waiters.

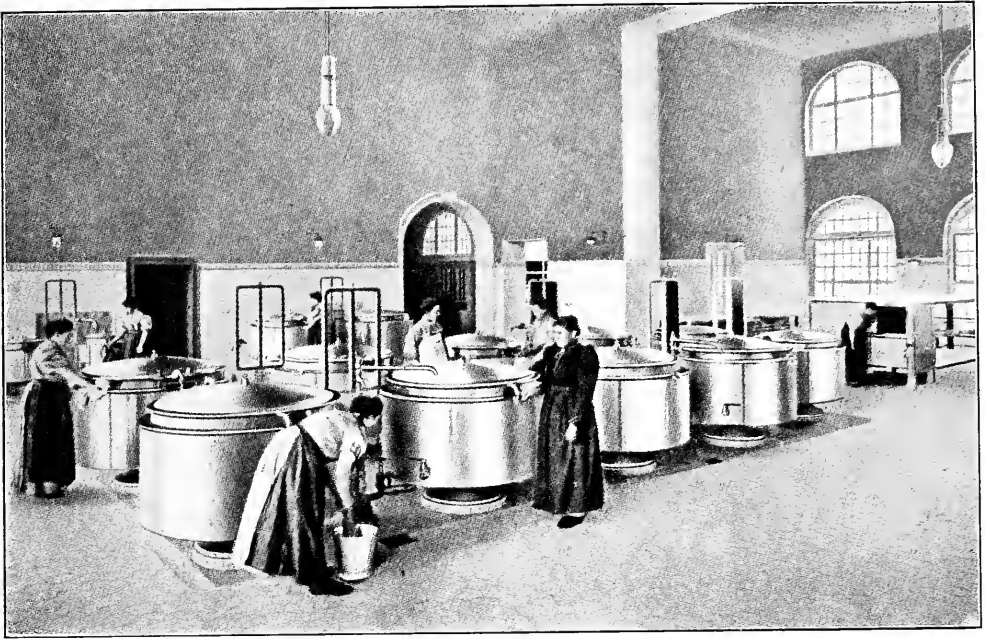


FIG. 303. RUDOLPH-VIRCHOW HOSPITAL. VIEW IN KITCHEN.

More attention is paid to the design and finish of the kitchens in many of the larger European hospitals than in this country. (Figs. 301, 302, 303.)

Like the kitchen, the *Laundry and Disinfecting Plant* should have an accessible location to which the soiled linen and articles of disinfecting can be easily brought and from which the fresh linen can be removed. The size and character of the building is, of course, governed by the requirements and size of the institution.

In planning the hospital laundry, the same care and thought should be used as in planning a factory; that is, to secure the greatest efficiency in the work, from the bringing in of the soiled linen to the delivery of the clean. From the sorting room to the linen room, an effort should be made to avoid lines of crossing and re-crossing; one process should follow the other until the work is completed. The washing or wet work should be kept separate from the ironing or dry work.

If, as is quite common now in hospitals, the soiled linen is bagged at the ward unit, then easy transportation should be provided for these bags, and a

covered corridor above or below ground is quite desirable for this transportation.

In regard to the equipment of the laundry, much may be said, but whatever apparatus is used, the principle which has been set forth for the conservation of human energy should be brought into play in this department. For a single example take the sorting bins; if these be placed high enough so that it is not necessary to stoop every time a single article is handled and if these sorting bins are made with easy-rolling wheels, the transmission of the soiled linen will be secured with the least amount of fatigue on the part of the operators.

The various items of machinery should be selected for the efficiency they will show. A washing machine capable of doing the work of three ordinary machines and costing the price of two is an economy. The same is true with reference to the extractor, the mangle, the drying tumbler, etc.

Electricity is rapidly taking the place of gas and steam in many of the laundry operations. The body ironer is being superseded by the steam press.

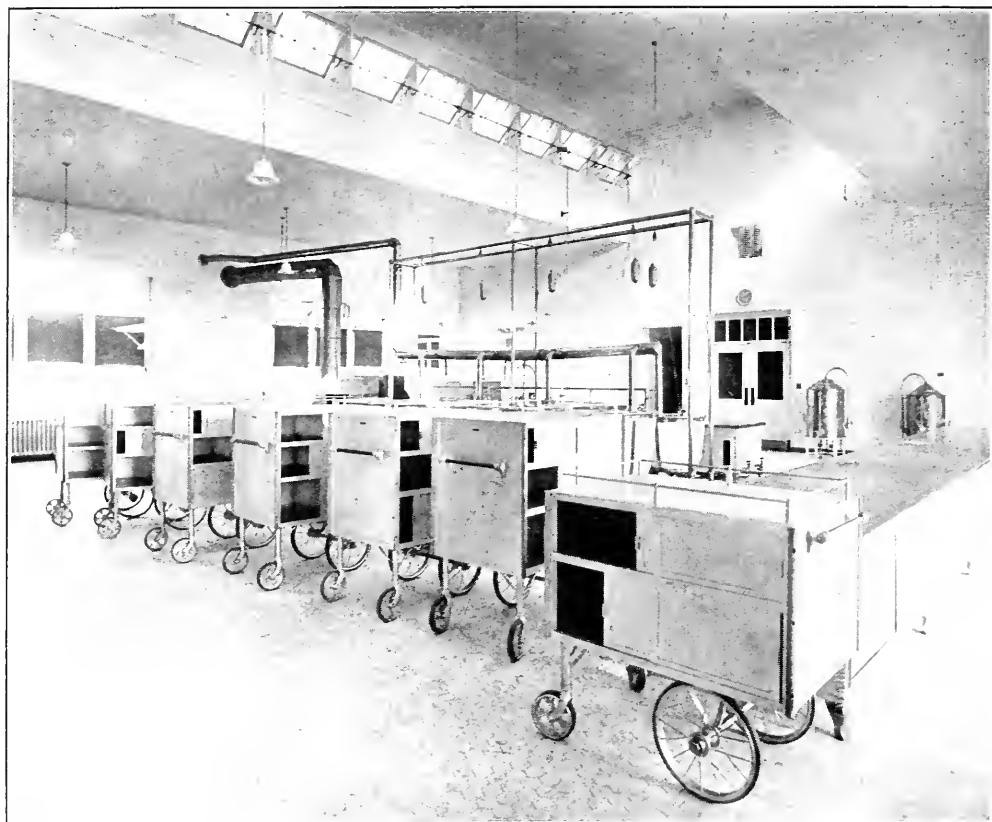


FIG. 394. CINCINNATI GENERAL HOSPITAL. VIEW IN KITCHEN, SHOWING FOOD CARRIAGES.

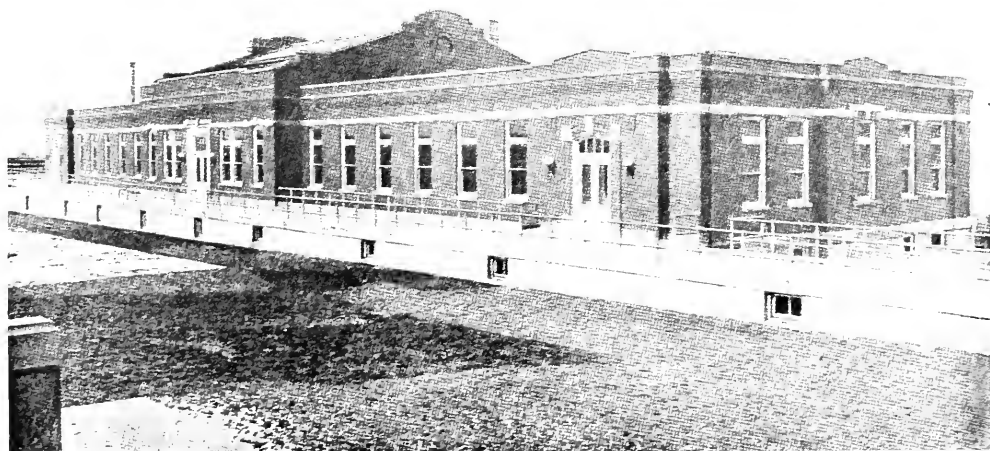
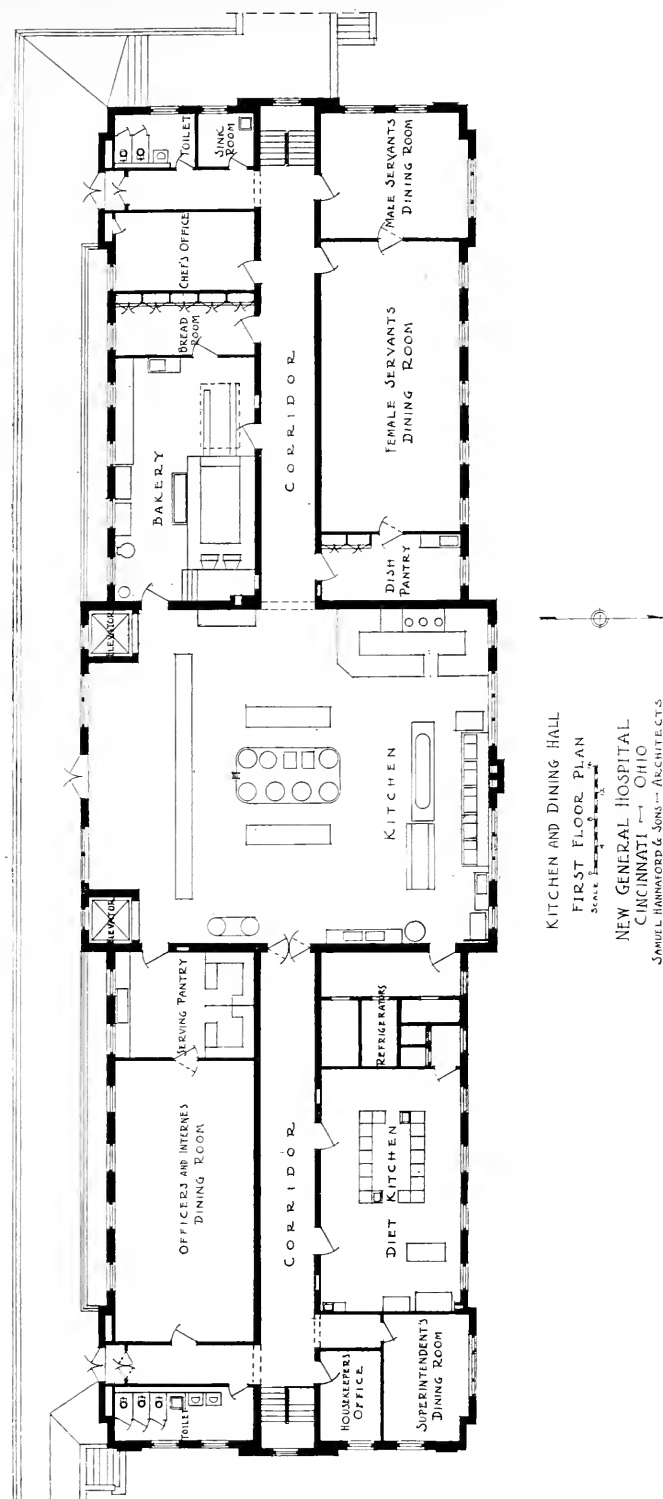


FIG. 395. KITCHEN BUILDING—NEW GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.



KITCHEN AND DINING HALL
FIRST FLOOR PLAN
SCALE 1/8" = 1'-0"
NEW GENERAL HOSPITAL
CINCINNATI — OHIO
SAMUEL HARRIS & SONS — ARCHITECTS
CINCINNATI — OHIO

FIG. 309.

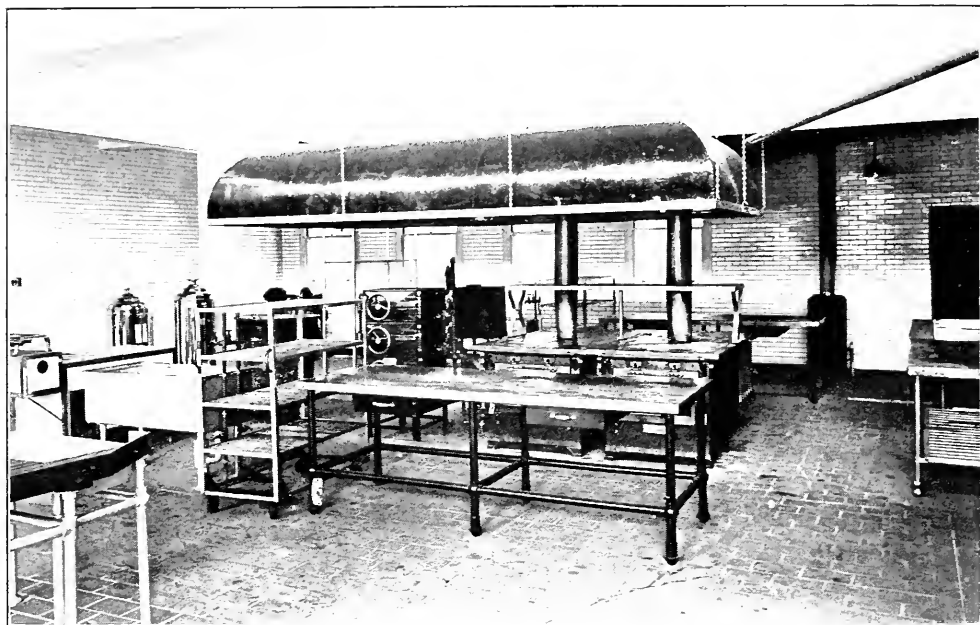


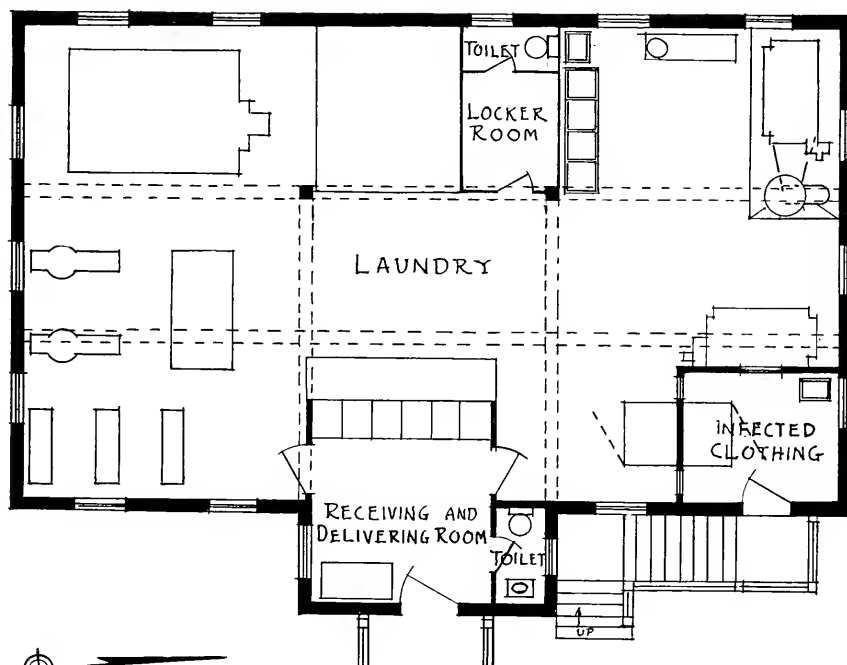
FIG. 306. OHIO VALLEY GENERAL HOSPITAL. VIEW IN KITCHEN.



FIG. 310. MAIN KITCHEN, ROSS PAVILION--ROYAL VICTORIA HOSPITAL.



FIG. 311. SERVING KITCHEN, ROSS PAVILION—ROYAL VICTORIA HOSPITAL.



FIRST FLOOR PLAN

FIG. 314. ST. LUKE'S HOSPITAL, JACKSONVILLE—LAUNDRY BUILDING.

care of in the soiled linen sorting room; then carried to the wash room where the wet-washing work is done; thence through the drying room, mangle and

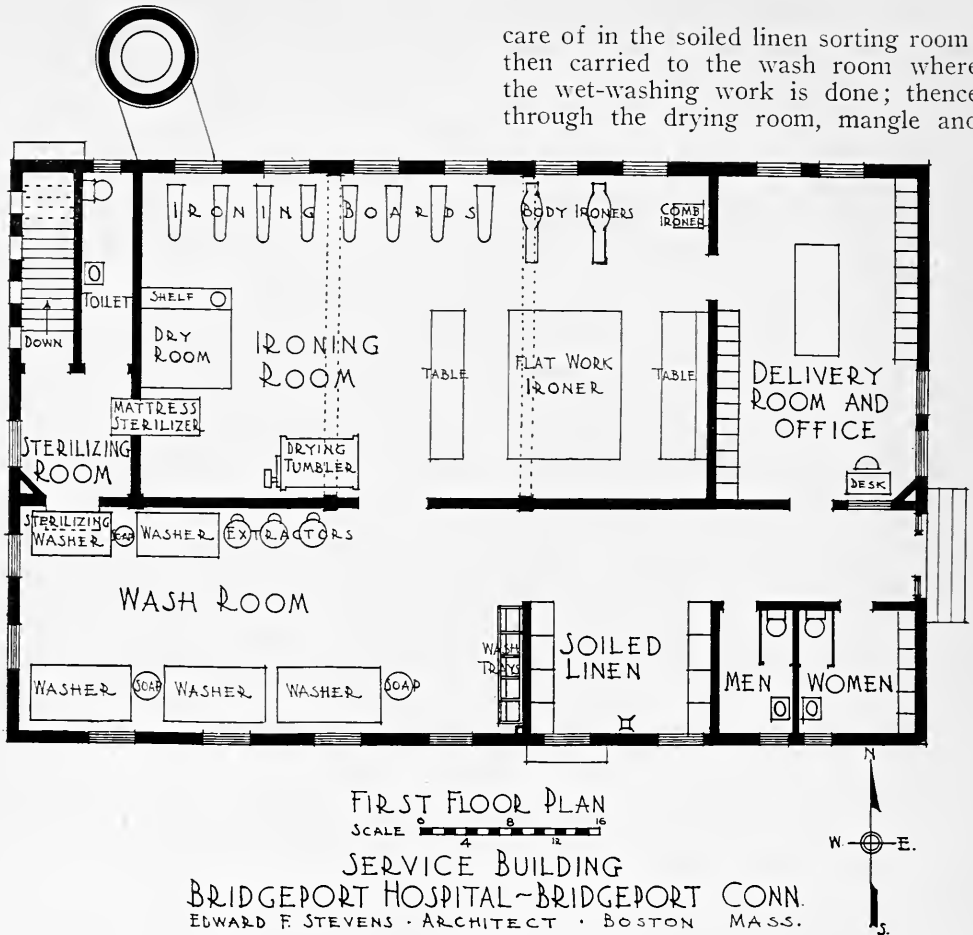


FIG. 312.

In a large hospital it is considered desirable to have the staff linen laundered in an entirely different department from the hospital linen.

It is undoubtedly an economy to have the main linen room of the institution connected directly with the laundry, from which the freshly laundered articles as well as the new supplies can be given out. In this way, the linen, whether new or old, is under one supervision.

A few illustrations will serve to show some of the points mentioned.

In the laundry of the *Bridgeport Hospital* (Fig 312), the writer has attempted to work out the principles mentioned; that is, the soiled linen is the first taken

linen room, into the main linen supply room. Provision for infected clothing, which is brought in through a separate entrance and introduced into the washing department of the laundry through a sterilizer or sterilizer washer, is here provided.

In the small laundry of the *St. Luke's Hospital* at Jacksonville (Fig. 314), where care of both general patients and contagious cases is provided, the same provision is made for the infected linen—passing through a disinfectant before reaching the laundry proper.

Fig. 315 shows the interior of the laundry of *Hospital for Sick Children*, at Toronto.



FIG. 315. HOSPITAL FOR SICK CHILDREN, TORONTO. LAUNDRY BUILDING. INTERIOR VIEW.

CHAPTER XV.

Heating, Ventilating and Plumbing

The power plant, the center of the mechanical end of the hospital, in many respects is not unlike the power plant for any institution or manufactory. An hospital plant, however, is unique in its demand for the production of steam in an economical way, the transmission of the steam into horsepower energy, either for generating electricity, furnishing high pressure steam for laundry, kitchen, or sterilizing room, inasmuch as steam—i. e. high pressure steam or its equivalent—is needed twenty-four hours a day and three hundred and sixty-five days in the year for sterilizing. Therefore there is little saving made, even in a small plant, by using low pressure heating and using gas or electricity for sterilizing.

Using steam for sterilizing, cooking,

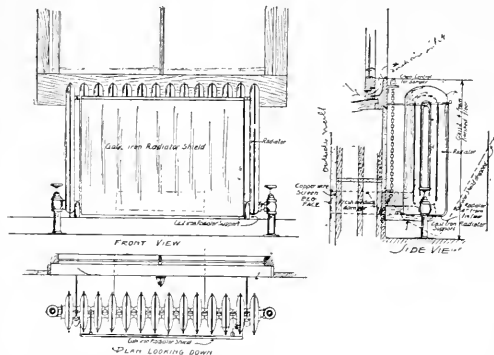
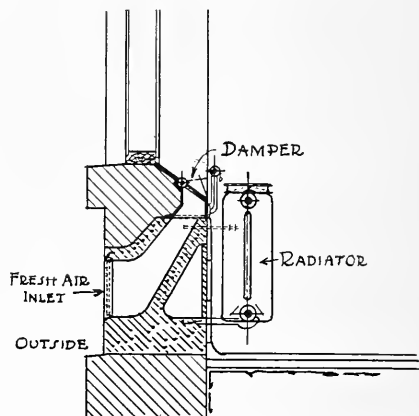


FIG. 320. DIRECT-INDIRECT RADIATOR, SHOWING REMOVABLE SHIELD.

and laundry, it can be readily seen that the generating of electricity would show a marked economy, even in the small institution, for in the heating months the exhaust steam from the engines would serve for heating the buildings, reducing the cost of current and heating to a minimum. It is not intended, however, in this book to discuss the power plant methods, but merely the portions of the plant affecting the health and comfort of the patient.

The much discussed problem of how properly to *heat and ventilate* a hospital building has still many unsettled points, almost as many as the floor problem. It



METHOD OF HEATING GENERAL HOSPITAL AT VIENNA

FIG. 321.

is still undecided whether it is best to conduct the air to the ground floor or basement, heat it there, send it through the building warmed, washed and humidified, and force it into the closed room under thermostatic control at a given temperature night and day, a system which necessitates for its perfect working the closing of all doors and windows; or whether to heat the air by means of indirect radiators in the basement or pipe space and conduct it by its own ascensive force to the rooms or wards; or whether to use the simple system of putting the heating units in the room and introducing outside air directly below or above the radiators; or whether by direct hot water, direct steam, or a combination of various systems.

One of the simplest methods and one adopted by the writer for securing fresh warmed air is a modification of the commercial direct-indirect radiator.

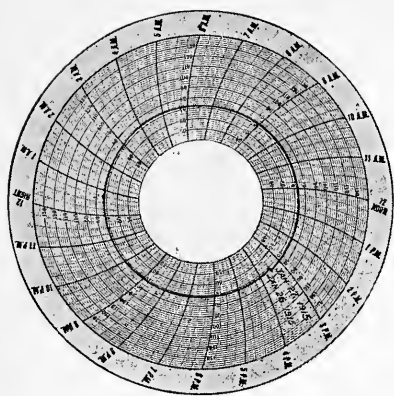


FIG. 322. HEATING CHART, SHOWING UNSERVICEABLE CONDITION FOR SICK ROOM.

(Fig. 320). A radiator (hospital type preferred) is set on brackets four inches above the floor; air is introduced through the outside wall directly in line with the bottom of the radiator. A shield, hinged at the bottom to allow for cleaning and extending under the radiator joining the intake pipe, prevents direct cold air from entering the room; and a damper in the direct flue governs the amount of

air. At the new General Hospital at Vienna, out-door air is introduced directly above the radiator, as shown in Fig. 321.

Many medical men and hospital experts agree that the patient in bed, except in special cases, should not have a high temperature in his room. They agree that Nature calls for changes in temperature—that the man in robust health demands them; that the patient who is building up his strength should not be denied them. A certain professor in a technical school used to say to his class that the ideal temperature is that of a sunny June day in a New England pine forest. Such an ideal does not in-

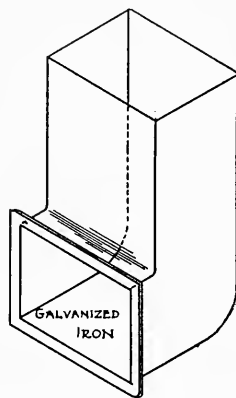


FIG. 324. DETAIL OF VENT FLUE ABOVE FLOOR.

volve an even temperature of sixty-eight degrees for the entire day.

Manufacturers of various apparatuses pride themselves on controlling the temperature of a room to a fraction of a degree, as shown by chart record (Fig. 322). This would not seem to be conducive to the best results, excepting under certain conditions.

The breathed air in a ward or room should be in some way removed, and the means for ventilating so located as to insure a complete circulation of air. If the room is large, there should be vents at top and bottom, with dampers, so that the air can be drawn from either one or the other, by properly adjusting the damper.

The vent ducts should start at the floor, and the floor material extended

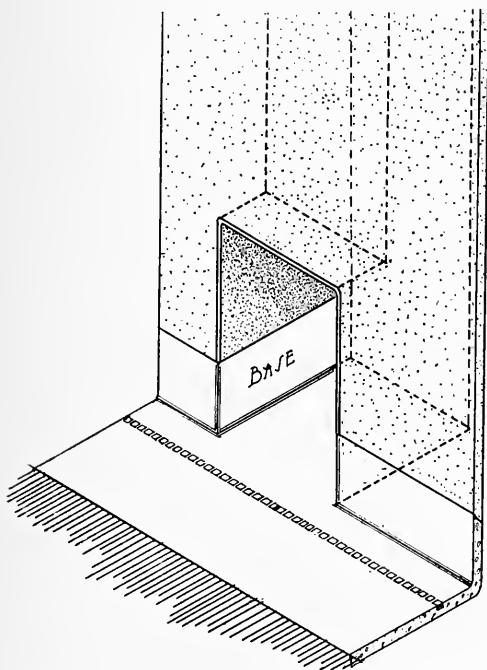


FIG. 323. DETAIL OF VENT FLUE AT FLOOR.

to the back of the flue (Fig. 323), or the bottom of the flue curved so that no dust shall remain in it. In no case should a register face be used to close the opening at the floor.

However the air is introduced, the exhaust should be placed so as to vent all parts of the room. If the air is introduced at or near the window, the ex-

haust should be placed at least thirty degrees to a monitor vent. The result is ideal heating and ventilation, but the difficulty of using this method in large units is the necessary waste space involved in the sloping ceiling and the monitor, although this has been carried out in the Children's Hospital in Boston, in the State Hospital School for Crippled Children at Canton, Mass. (Fig. 326), and in the children's ward of the Worcester City Hospital (Fig. 146).

The use of hot water for general heating and steam for special ventilating units gives satisfactory results. The hot water may be in coils of large pipes, easily cleaned, or radiators of hospital type set away from the wall; but the common ornamental radiator, set close to the wall, should never be used in the sick room, since every surface should be available to the brush or vacuum cleaning pipe.

The heating of the operating room at St. George's in Hamburg is one of the more elaborate systems. In the section shown (Fig. 72), it will be observed that the outer sash is double and the air conducted entirely around this hollow space, warming in winter and cooling in summer the floor, the walls, and the ceilings. In winter, additional heat is secured from direct radiators behind thin nickel plates shown in the walls, but allowing no air from this source to enter the room. The air for the operating rooms is brought first into a clean chamber where it is passed through ground coke, thence over heated coils in winter and over ice in summer, into the fan, where it is driven through a filter of fine sand and gravel, and taken thence to the operating rooms, practically free from all bacteria. The ceiling vents in the operating rooms are closed and there is sufficient pressure outward so that the opening of a door does not admit any foul air.

A simpler method for the heating and supplying of fresh air for the operating room is by the use of a screen or false wall inside the operating window. The heating unit is placed between the screen and the outer window, introducing outdoor air at the top (not the bottom) of

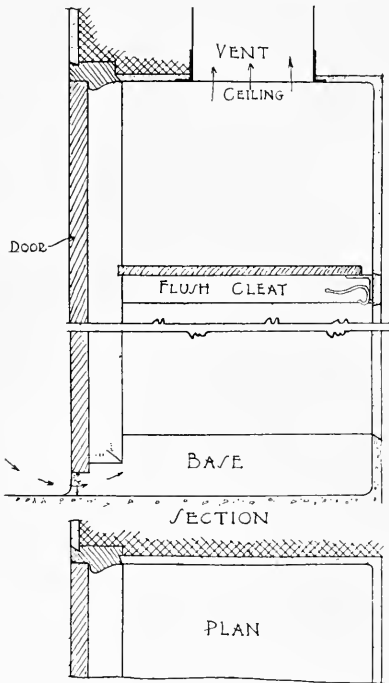


FIG. 325. DETAIL OF VENT THROUGH CLOSET.

haust should be near the door. The desirability of ventilating the clothes cupboards as well as the room led the writer to adopt the method of placing the room vent in the ceiling of the cupboard, cutting the door thereto so as to leave an open space below, setting the cupboard shelf away from the wall, and in this way allowing a free circulation of air, ventilating the room and cupboard. (Fig. 325.)

The natural "tepee" form of ventilation is used in a number of Massachusetts institutions—that is, providing for heat units on the outer walls, either radiators or coils; making the side walls low, about seven feet, and sloping the

the radiator. The air from the room drawn under the screen mingles with the outdoor air, is heated, and passes out over the top of the screen, warming the room by this inflow and by direct radiation from the glass screen. Additional radiating surface may be placed above the ceiling lights. To prevent the entrance of any dust from outside, gauze

removable screens may be placed in the openings at the top of the screen. A section through the operating rooms of the Ross Pavilion of the Royal Victoria Hospital (Fig. 327) will serve to show this method, and a reference to the illustration of operating rooms at the Bridgeport Hospital (Fig. 82) will show the effect from the room.

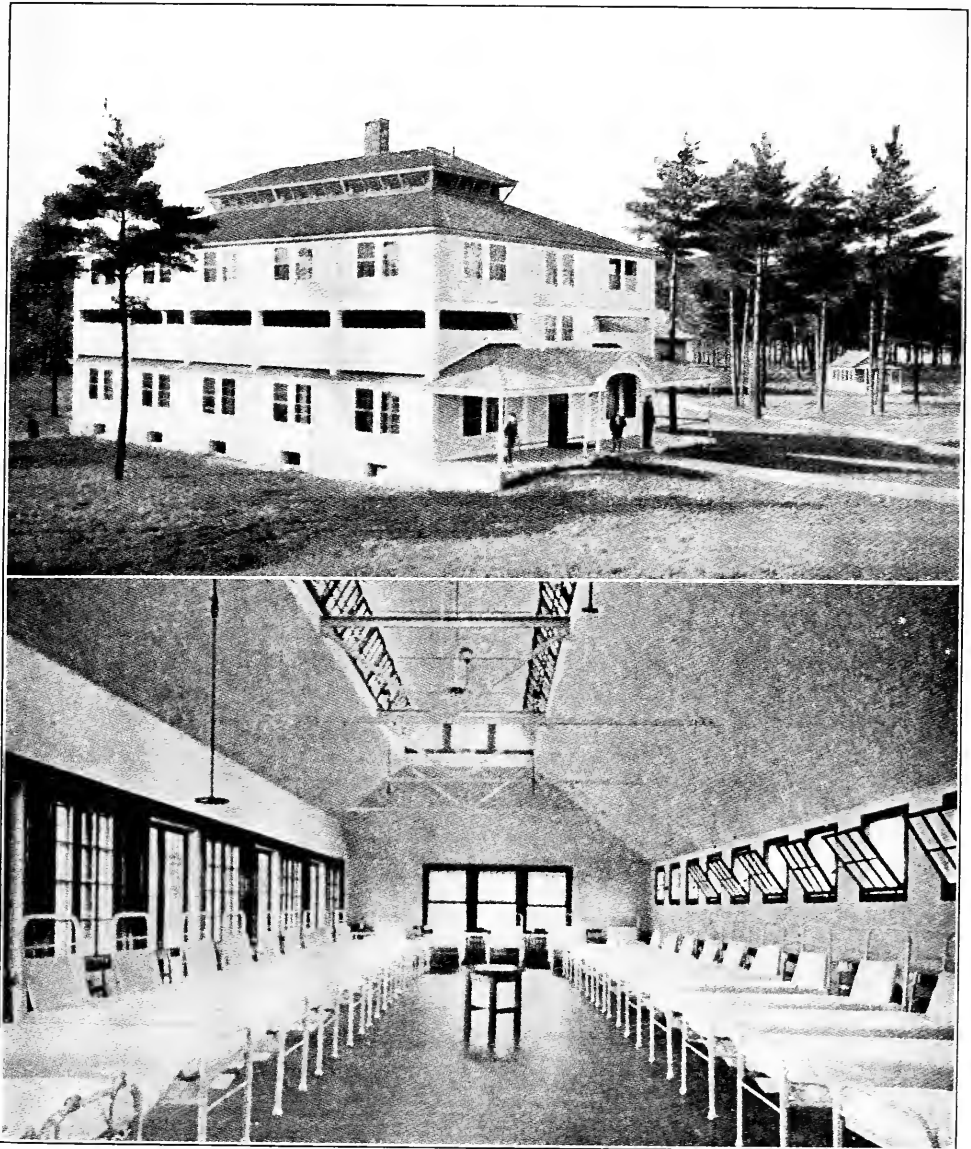
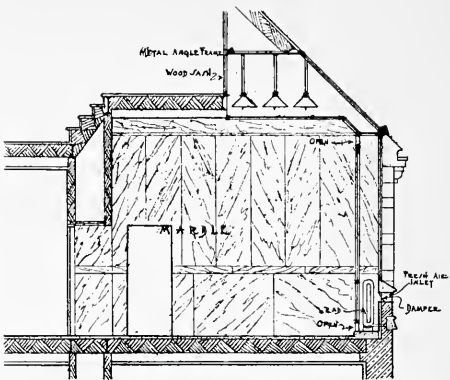
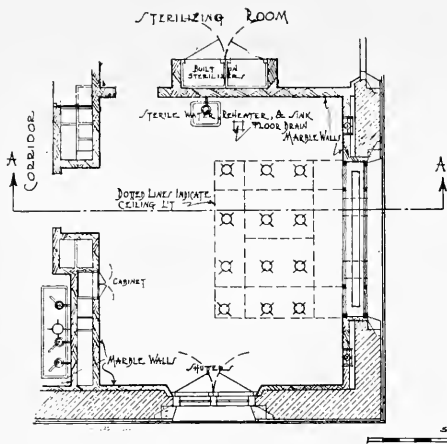


FIG. 326. HOSPITAL SCHOOL AT CANTON, MASS. SHOWING ROOF VENTILATION.



PLAN OF OPERATING ROOM

SECTION THRO' OPERATING RM. ON LINE 'AA'

ROSS PAVILION - ROYAL VICTORIA HOSPITAL

MONTREAL, QUE.

FIG. 327.

Additional radiation may be secured by radiators entirely concealed in wall pockets whose openings are covered with metal plates or marble slabs. Fully fifty per cent. of the radiation is lost in this process, though the radiator is hidden effectually and hygienically.

It is desirable to use forced ventila-

tion in the operating suite, if nowhere else. If the suite is small, the fan may be placed nearby and operated when the rooms are in use. Gravity ventilation, however, should be provided, with a by-pass valve so connected with the switch and fan that when the fan is stopped the damper automatically opens to the

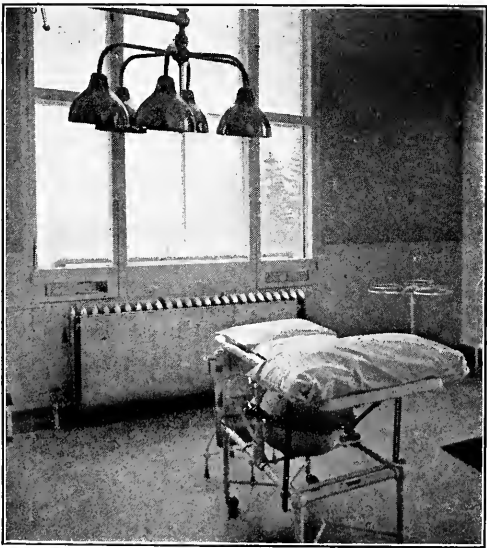


FIG. 328. QUINCY CITY HOSPITAL. OPERATING ROOM, SHOWING RADIATOR SHIELD AND CRANE LIGHT.

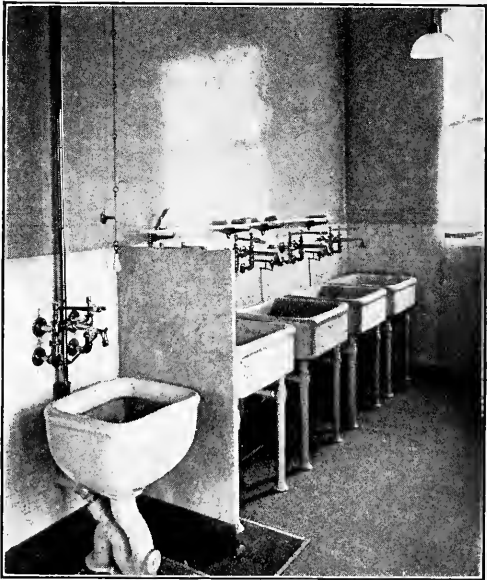


FIG. 330. QUINCY CITY HOSPITAL. SURGEONS' SCRUB-UP IN OPERATING SECTION.

gravity vent, which itself should be accelerated by a steam coil.

No attempt is made here to furnish data for the power plant or the heating and ventilation of the hospital, for these should be worked out with the heating specialist; but these few suggestions are offered as the results of the observation of the writer in his own practice.

Hospital *plumbing*, so far as the pipes, drains and vents, and the so-called "roughing-in" are concerned, is no different from that for any other building of like grade; but the actual fixtures should be selected or designed for the purpose for which they are to be used. Hospital plumbing should be standardized as far as possible.

Where practicable, fixtures should stand clear of the walls to facilitate cleaning and to prevent vermin from finding a lodging, and the wall immediately behind the fixture should be protected with tile placed flush with the adjoining plaster. If this is done, the ill effect of spattering will not be serious.

The plumbing *trap*, in our modern times, is the one necessity of every plumbing fixture which has the reception and discharge of liquids into the drainage system. It can readily be seen, if the hygienic condition of our fixtures be considered, that this trap should have two possibilities—

- (a) To safeguard properly the escape of sewer gas or sewer odor into the room;
- (b) To be so constructed that the *inside* as well as the outside, or at least the inside to the water line, shall be accessible for frequent cleaning.

To do this latter readily, the trap must be set close to the fixture, and have a removable strainer for cleaning. Few medical institutions, even, have traps accessible in this way. And still how important this feature is! Of course every trap should be vented or have some anti-syphon device, but the local plumbing law generally governs this feature.

Overflows constitute another filthy, unhygienic condition that exists in nine

out of every ten bowls, sinks, or bathtubs in general use. These are generally built integral with the china or iron, never smooth at best, and rarely get-at-able in any way. The construction of all bowls and sinks should be simplified by the use of the celluloid standpipe, which is light and easily cleaned; or the full, open overflow, with strainer, or similar device. In the double sink, if the partition is a little lower than the sides, one sink serves as an overflow for the other.

The washing in running water, required by certain religious sects, is really the ideal of cleanliness.

The *pipng* requiring polishing should be reduced to a minimum, for the care of brass work is a considerable item of expense in a large institution. Where polished brass is desired, yellow metal should be specified. Heavily nickel-plated pipes and fixtures wear well. Pipes and fittings finished in white enamel, properly applied, are very satisfactory. The traps and less conspicuous parts may be bronzed or painted, saving considerable expense.

The new type *watercloset*, hung from the wall (where the construction will permit), is a great improvement over the old styles, and is being used in many institutions. The material selected for the seat is important; if covered with celluloid or some other acid-resisting substance and cut away in front, it is much more hygienic. The cover, as a rule, should be omitted. The flushing can be accomplished either by a flushing valve, low-down or high tank so long as it works properly. The water seal, quiet action, and appearance are all questions to be considered.

The *slop sink* in the work room is used largely for the emptying and cleansing of bed pans and urinals, and the fixture should be so planned that this can be accomplished quickly and easily. To do this, the hopper must have a large, unobstructed outlet like that of the watercloset; it should slope quickly to the outlet; means of cleansing the inside must be provided, either by a flushing rim or a short piece of flexible hose, or both, the hose being the sim-



FIG. 332. ST. LUKE'S HOSPITAL, JACKSONVILLE. ISOLATION DEPARTMENT. ADMITTING ROOM, SHOWING ADMITTING BATH.

plest method of cleansing the inside of the utensils. The fixture should be set high enough so that the work can be done without stooping. If a sterilizing hopper is wanted, secure one in which *all* the contents can be sterilized, and one which can be easily cleaned and repaired.

Many of the so-called "clinic" hoppers are simply a complicated mass of valves, pedals and sprays, which need a mechanic to operate and keep in order. The simpler the fixture (Fig. 330), the more effectual it is.

Bath tubs for patients should be set up from the floor for two reasons—facility of cleaning underneath, and ease in bathing if nurse or attendant needs to assist. The inlets should be large, allowing the full discharge of hot and cold water at the same time. The type of inlet used on ocean steamships allows of quick filling. The overflow, if any, should be easily cleaned; but in most cases, there is no need of an overflow. A plug or standpipe and not a "flow-back" form of concealed standpipe should be used. The celluloid standpipe, which is light and easily cleaned, is less likely to cause damage if dropped.

It is the opinion of many hospital ad-

ministrators that the only way to be sure that a patient is thoroughly bathed is to use some form of shower bath. This may be a shallow tub or bathing slab, set high but within easy reach of the attendant, the patient being washed in clean, running water by means of a hose and spray, the tub or slab becoming merely a drain for the water. In this way all of the dirt goes directly to the drain and is not diluted and used again on the body. This form of bath (Fig. 332) should be used with entering patients, particularly in the contagious and children's departments. In many of the European hospitals for women this form is the only one used. The same principle serves in the portable tub (Fig. 153) described in Chapter IV. Provision must be made in the plumbing, however, where this form is used, for a suitable floor drain and a hose connection to the room fixture.

The principle of the high, shallow tub or slab is quite generally used in bathing children (Fig. 333) and infants. In both cases some reliable temperature-controlling device should be placed on the supply or a separate storage tank placed directly above the bathing slab. This tank should have a visible ther-

mometer and water gauge. The use of the spray can be facilitated where there is a storage tank by using a self-closing spray head.

The infants' bath is naturally smaller than the children's, and the slab may be heated by admitting hot water to the closed space in the porcelain directly under the slab.

The *wash bowl* or lavatory now placed without restraint in the patients' rooms and the open corridor, as well as in the



FIG. 333. BABY BATH.

toilets and wash rooms, should be designed on the same simple lines suggested for other fixtures. The non-concealed overflow, the removable strainer, and the high trap, all are desirable features; in fact, in nine cases out of ten the stopper can be eliminated if a combination faucet is used; for, once accustomed to washing under running water, the filled bowl and washing in dirty water will be abandoned.

For ward bowls, bowls in corridor, and bowls for scrubbing up for dressings, the wrist or elbow mixing-valve may be used to advantage (Fig. 334).



FIG. 334. TYPICAL LAVATORY FOR PATIENT'S ROOM.

Where it is desirable to fill the bowl, a standpipe of celluloid, made to fit the opening, gives an easily cleaned overflow.

The scrub-up for the surgeon, as a preparation for operation, has undergone various changes: from the foot valve, good at times but depending on an even-pressure of the foot of the surgeon to produce an even flow of an even temperature; then various forms of the knee valve, dependent upon a mixing

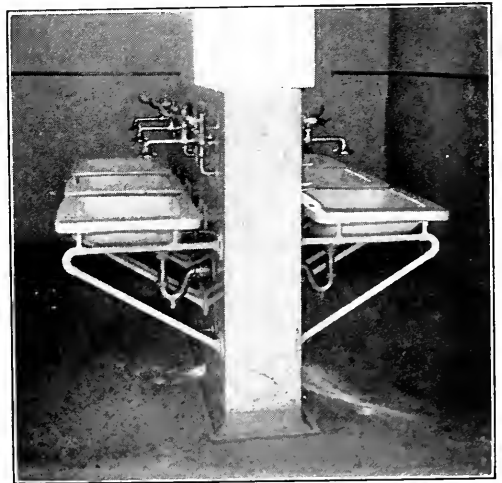


FIG. 336. OHIO VALLEY GENERAL HOSPITAL. SURGEONS' SCRUB-UP.

valve for the temperature, without regulation of flow; up to the simpler elbow or forearm control. Again we find that the work of the European specialists has given us models from which to work. A page from a Swiss plumbing catalogue (Fig. 335) shows a variety of simple forms of both foot and elbow action valves.

For the scrub-up for a number of surgeons, the long sink with several sets of outlets has proved satisfactory. Single bowls, set together on one central screen, as at the Ohio Valley General Hospital (Fig. 336) or the Youngstown Hospital, allows of easy access. In the smaller hospital this same idea may be carried out with a raised basin in the center of the operating rotunda, as at the Charles Choate Memorial Hospital (Fig. 337); for, with the combination non-hand-touching valve, all that is needed is sufficient spillway for the water. This

form of scrub-up valve placed over the work-room sink gives an additional place for washing. It may be placed over a simpler sink in infectious wards, allowing for the special cleansing of the nurse's hands and the giving of the baths in the portable tubs (Fig. 338). (See Chapter VII.)

The *floor drain*, highly important in certain sections, may be a menace to health unless properly constructed and kept filled with water. For operating and autopsy rooms a flushing rim trap is desirable. This top should be solid, to resist the movement of heavy furniture (Fig. 339).

The *autopsy table* is generally made a part of the plumbing, and a simple fixture which has proved satisfactory is shown herewith (Figs. 340 and 341). The center is the highest part, allowing the fluids to flow away from rather than toward it. A small sink, made integral,

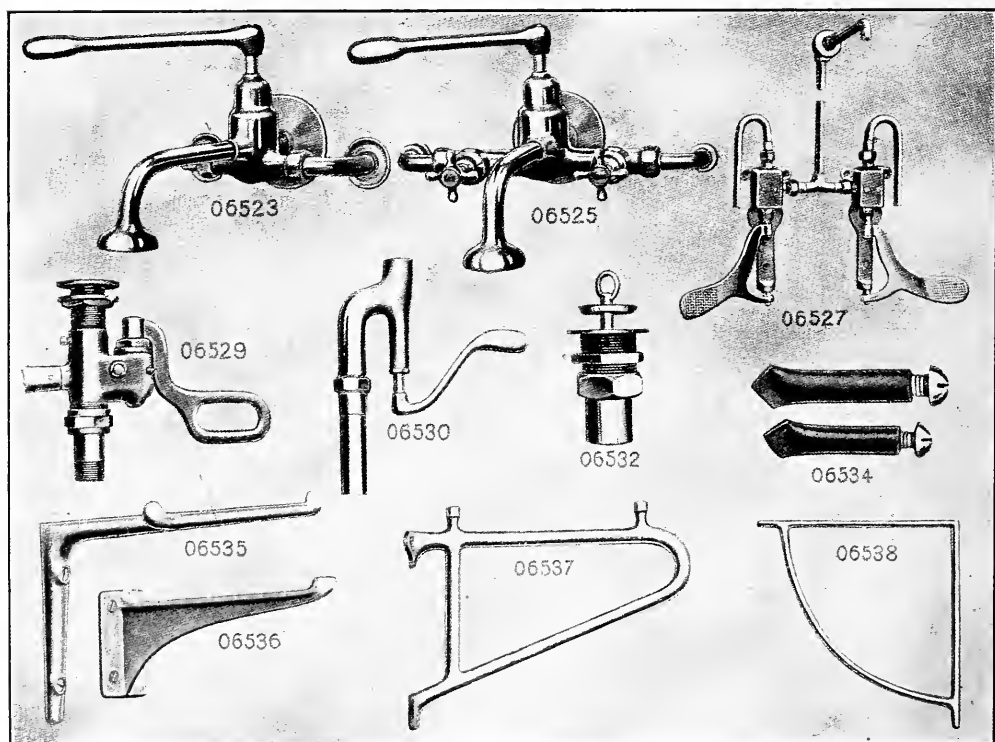


FIG. 335. A PAGE FROM A SWISS PLUMBING CATALOGUE.

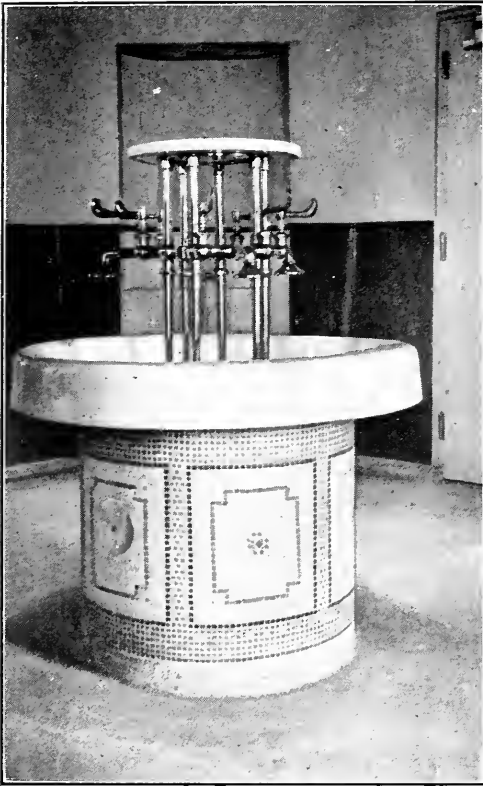


FIG. 337. CHOATE MEMORIAL HOSPITAL.
SCRUB-UP SINK.
Edward F. Stevens, Architect.

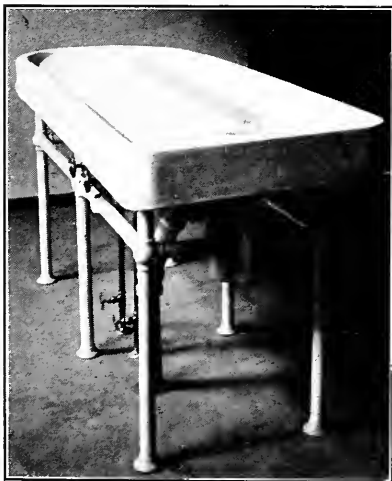


FIG. 340. AUTOPSY TABLE. SHOWING DRAIN
TOWARD OUTSIDE OF FIXTURE.

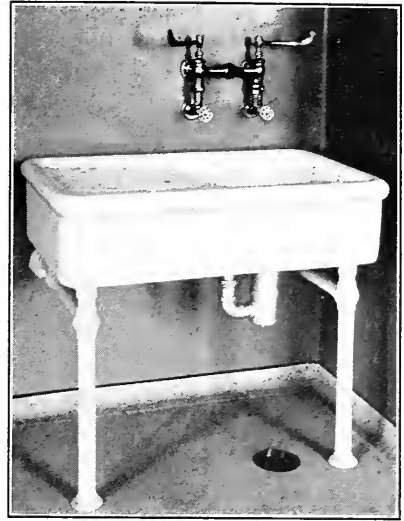


FIG. 338. SINK FOR ISOLATION WARDS, SHOW-
ING ELBOW VALVE AND FLOOR DRAIN.

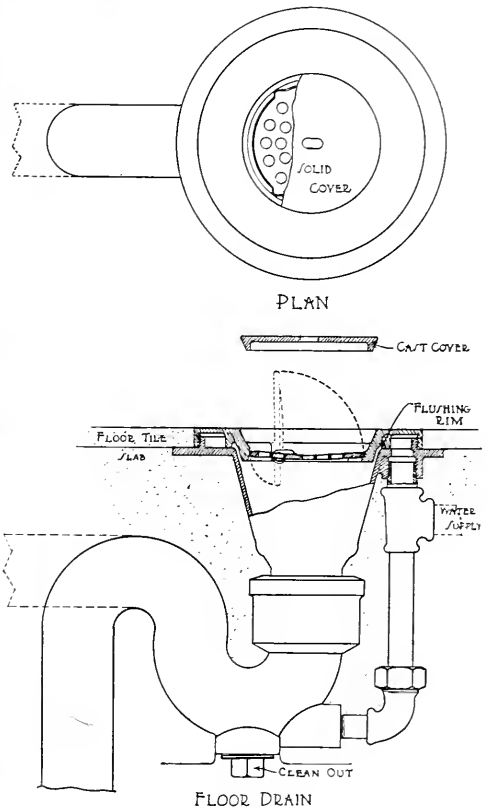


FIG. 339.



FIG. 342. "BUBBLING" DRINKING FOUNTAIN FOR HOSPITAL CORRIDORS.

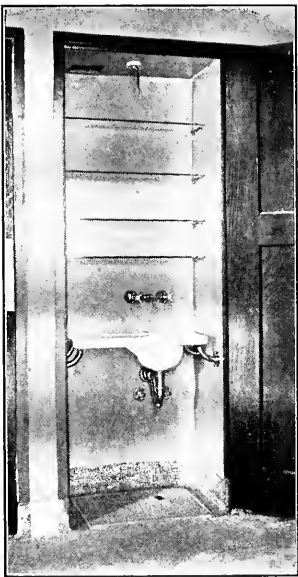


FIG. 343. MEDICINE CLOSET.



FIG. 341. MARBLE AUTOPSY TABLE, WITH SINK ATTACHED.

is provided. A simple means of flushing is obtained by using a flexible hose pipe, into which a copper wire is inserted. By means of this the end of the hose may be made to remain in whatever position it is placed, allowing the flushing action to go on without interruption.

The *drinking water* problem of the hospital has been solved in various ways by various hospital men. There should be a goodly supply of pure water easily

procurable for the patient, for the nurse, for everybody.

The system used by the writer at the Ohio Valley General Hospital and at the Royal Victoria Hospital is to distill all the water for drinking and clinical purposes. On each floor, outlets were provided where the water is cooled, installing a fountain for patients' use (Fig. 342). This fountain is provided with an outlet for drawing water into a receptacle as well.

CHAPTER XVI.

Details of Construction and Finish

The exterior details of the hospital should be made to conform to the style of architecture in which the building is designed and should be left to the architect, it being borne in mind that the detail and exterior treatment should be subservient to the plan; in other words, the exterior should be designed around the plan, and not the plan made to suit the elevation as is so often the case. Economy in construction can be realized by establishing units in the planning, by having the partitions continuous and the plumbing of one story near that of the others.

The interior finish, especially in the patients' rooms, should be carefully studied from the economic and hygienic sides. Projecting surfaces are difficult to keep clean and should be eliminated as far as possible. If the door jambs are made of steel pressed to a suitable form, with angles rounded, and are set to form a ground for the plasterer, there will be no projection. To avoid the usual sharp angle at the junction of the door jamb and the floor, the door stop should be omitted for a few inches above the floor and the coved base allowed to run through the jamb (Fig. 350). If the door jamb is of wood, the same general detail can be used; and to protect against the slight sinkage of plaster, a small oval wood or metal strip can be used. Transoms, where used, may be the thickness of the door, and the usual projection avoided.

The base around the rooms can be made of the floor material or of tile, marble, metal, wood, or any enduring material, depending on the appropriation and the individual preference: but if coved at the juncture of wall with floor, made flush with the wall line, and carried through the door jamb of the same material, the hygienic qualities are en-

hanced. To prevent the furniture from marring the walls, a furniture shoe formed in the base, three or four inches from the wall, can be used to advantage. Bases and door jambs of this type are set before plastering, so that every part of the finish is smooth with the wall.

Windows should be placed low enough so that a patient in bed can readily see out upon the street. The same character of finish should be applied to windows as to doors. It has been found that the direct draught from a slightly opened window may be diverted if a deflector is placed in front of the opening. This can be formed in the window frame and so become permanent (Fig. 351).

All angles, whether wall, floor or ceiling, should be coved.

Doors should be smooth, without moulding. The no-panel slab doors are desirable; or if these prove too expensive, the one panel, or at most two-panel, door can be used.

Walls back of all plumbing fixtures should be tiled, with the tile on the same surface and even with the plaster. The walls of toilets, sink rooms, serving kitchens, laboratories, and similar rooms subject to much use, should if possible be tiled to a height of five feet or more.

Medicine closets for each unit (Fig. 352), built into the wall, should have no re-entering angle. They should have a small sink, with hot and cold water, and slab, with tiling at the back, shelves of plate glass or metal, artificial lights, towel rack, etc. If the unit is small, a built-in medicine closet at or near the corridor bowl can be substituted (Fig. 343).

The *clothes closets* for private rooms or wards (Fig. 325) should be built like the medicine closets. If the closet door is cut two inches short at the bottom, the vent for the room may be placed in the

closet ceiling, and the ventilation of both room and closet accomplished. (See chapter XV on heating and ventilating.)

Fixed equipment such as linen closets, kitchen cabinets, etc., should be constructed so as to leave a free space behind them. The linen closets should have open shelves or racks, so built that they are removable for cleaning; if the top is sloped, the minimum amount of dust is accumulated.

Hardware is a small but very important item, and should be carefully selected with an eye to its suitability for hospital purposes. Unsuitable, noisy hardware has been the cause of more dis-

turbance to patients in an institution than almost any other item in the construction. How often one sees the latches "muzzled" with a towel or special pad which slips around the knobs, or covered weights placed behind the door to prevent slamming. Hardware suitable for a dwelling, an office building, or a theatre is not suitable for a hospital.

How often the nurse, with both hands full, is annoyed and delayed in opening the door with the round knob! And how often the closing of the same door awakens or annoys the patient!

The opening of the door with both hands full can be accomplished with the

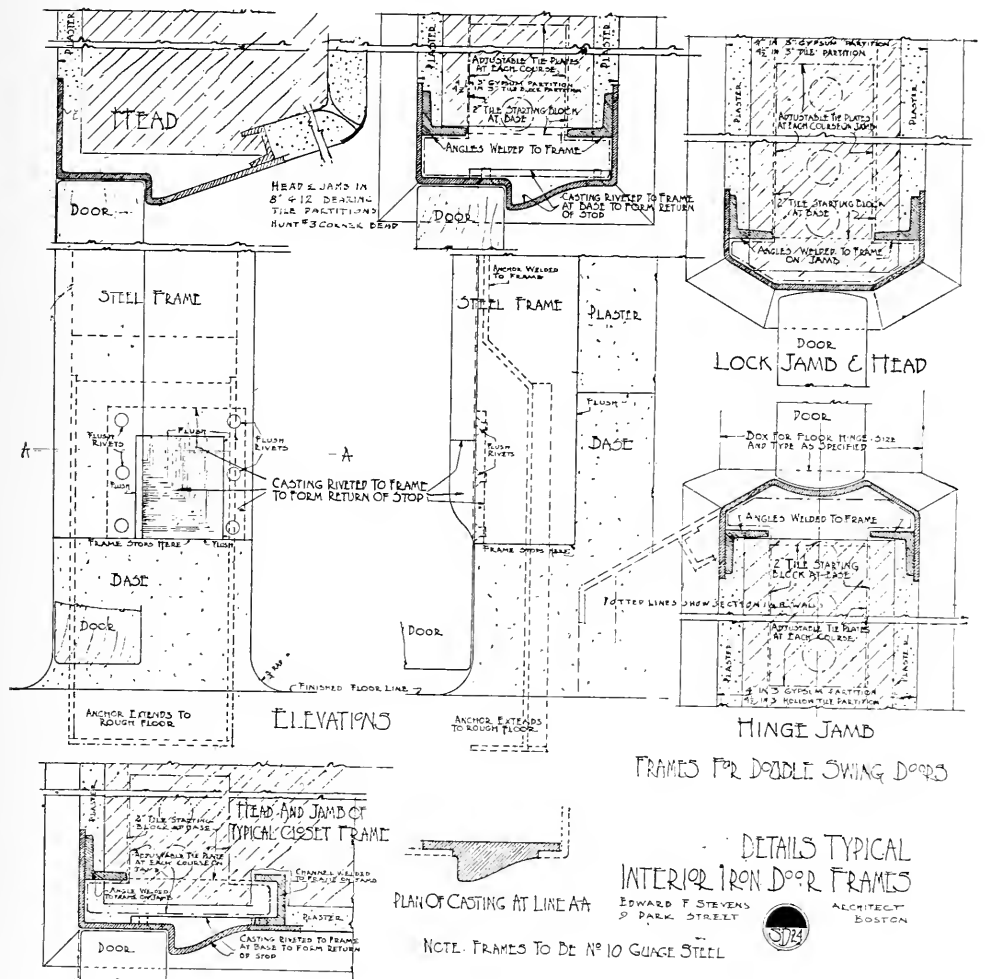


FIG. 350.

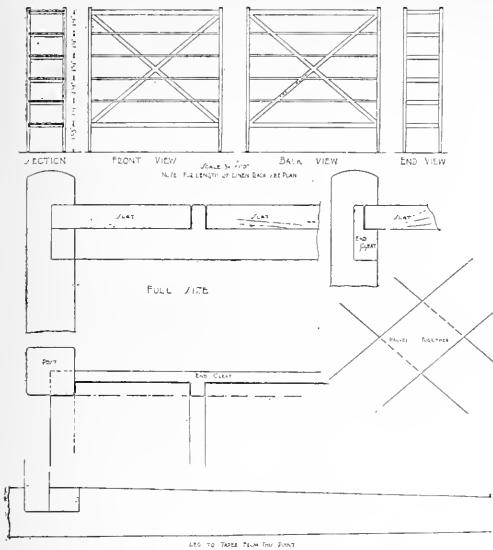


FIG. 353. LINEN CLOSET DETAIL.

angle door handle, and this is a good device where noise does not enter into the problem, as in service buildings; however, in psychopathic wards the handle should have no shank and should be turned down instead of up.

With an efficient checking spring and noiseless door holder, the latch bolt can be eliminated, and with it much of the noise from hardware; then, with the reversed *hook handle* (Fig. 355) placed on the inside of the door, one can open the door, with both hands filled, by slipping the forearm under the hook handle; and of course, with the latch eliminated, the door can be readily pushed open from the outside. For the occasional locking of the door, a dead bolt can be installed.

The hardware for the elevator doors should always run smoothly and afford protection against opening of doors when car is away from landing, but the silent feature should be emphasized in selecting this hardware.

With reference to *floors*, the persistent question "What is the best floor" is hard to answer. Among the leading architects and hospital men in Europe, the writer found the almost universal preference to be for tile, usually a light gray flint or vitreous tile, as large as

four inches, laid with a fine joint and against a coved base of the same material. In America, with every available material and numerous advocates of each, it becomes almost a case of individual preference. There are certain underlying principles, however, which should be considered:

- (a) Fitness for location.
- (b) Durability.
- (c) Artistic effect.

The patients' room should have some resilient material, quiet in color and reasonably non-absorbent; resiliency and durability should be considered for the corridor; and durability and non-absorbent qualities for the utilities.

Good results may be obtained with hardwood floors and perhaps they are as popular today as any other floor. With the fireproof buildings, however, the demand is for a floor of fireproof material.

Of the monolithic floors, terrazzo gives perhaps as good results as any simple, inexpensive floor; two colors may be used, one for the base and border and



FIG. 354. KITCHEN CABINET.

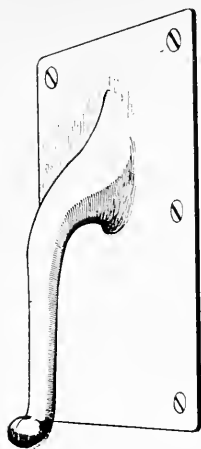


FIG. 355. DETAIL OF HOOK HANDLE FOR DOORS.

one for the field, with a dividing line between of single marble tessarae. Some of the magnesite floors are giving good results, when properly laid. This can be put down in contrasting colors and the artistic effect is pleasing. Under certain conditions—for example, when laid in kitchens and toilets, where very hot water may be spilled—this material is apt to disintegrate and to spot badly.

Quarry tile makes a good wearing floor for the service part of the hospital and for roof wards and airing balconies, and is artistic as well.

Where strict economy must be practiced, a good quality of cement floor, properly treated to prevent dusting, serves its purpose well.

All the asphalt floors should be avoided excepting for special places like portions of laboratories, refrigerators, etc., where an acid-proof floor is required.

Hard, fine-grained marble makes a most excellent operating room floor. Opalescent glass has been used more or less successfully for the same purpose.

For corridor floors, where there is much traffic, probably the best material is pressed cork tile. This is quiet, resilient, and wears well. Cork tiling and rubber tiling have been used in toilets and baths, but they possess little advantage over terrazzo or magnesite.

For wards and private rooms, wood floors are cheap and look well, but are

open to many objections. They shrink and swell, have many cracks to gather dust, and need constant refinishing. Maple is undoubtedly the best wood floor material for a hospital.

Almost everywhere in Europe linoleum is used for the floors of patients' rooms and wards, and its use is growing in favor in this country. It can be used not only for floors, but for stair treads, table tops, screens, and even for door panels. When properly laid, it is doubtless the most satisfactory material which can be found. Great care must be taken to have the floor underneath smooth and dry, and the material must be thoroughly stretched and laid upon the floor for several days before being fastened down, then cemented to the construction, the cement being applied to the entire under surface. If the newer colors and patterns of linoleum are used, the effect is very pleasing.

Too much care cannot be taken in the planning and arrangement of *artificial illumination*, especially for the rooms occupied by patients. The eye, at all times a delicate organ, becomes more sensitive in sickness. Beds should be so placed as

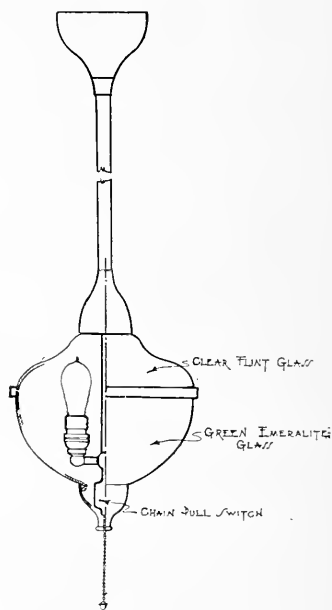


FIG. 356. DETAIL OF WARD LIGHTING FIXTURE.

to shield the patients' eyes in the daytime, which means that they should not face the windows. In open wards, this is avoided by the use of cross screens, as shown in the Bridgeport Hospital (Fig. 44) and in St. Luke's Hospital (Fig. 116). For night lighting, direct ceiling lights should be avoided; instead, reflected or obscured lights should be used, which give a soft glow over the whole room, with no bright spots. These ceiling lights can have lamps for greater or less illumination in the same fixtures; and with the low candle power lamps used for night service, the lamps can be rendered less disturbing to the patient by dipping in blue stain. The fixture placed near the ceiling, with an opaque or opalescent reflecting globe placed below the light, directs all the rays to the ceiling, and thence diffuses them through the room. The bowl-shaped fixture should be covered with a tightly fitting sloping glass top to keep out the dust and to allow of its easy removal (Fig. 356). A most attractive fixture is made by having the lower globe double, and interposing fabric similar in coloring to the curtains and covering of furniture (Fig. 357).

In addition to the ward or room lighting, there should be a wall outlet at each bed, where a portable table or wall lamp can be attached (Fig. 358). The wall outlet may be used also for current for an electric fan, electric heating pad, etc.

The artificial illumination of operating rooms needs most careful study. Rooms have been successfully lighted by rows of lights around the outer wall or on the ceiling near the wall; by a more concentrated light in the center with a bowl-shaped reflector; or by a fixture with several arms wide apart, so placed as to overcome shadows. A large fixture over the operating table is to be avoided on account of its tendency to catch and distribute dust; and if a central light is used, the swinging crane is to be preferred. This can be raised or lowered at will, or swung entirely out of the way when not in use (Fig. 89).

Concentrated light from powerful reflectors placed above the ceiling light gives very satisfactory results. (See Fig. 327.)

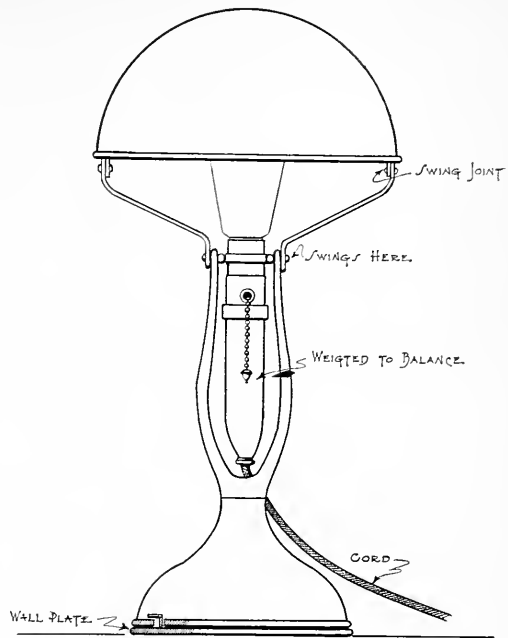


FIG. 358. PORTABLE BEDSIDE LAMP.

It is well to provide gas for an emergency light in the operating room. The enclosed drop mantle burner is satisfactory for the purpose. Emergency lights have been successfully made by the use of the Prest-o-lite tank, mounted on a portable tripod and surmounted by a reflecting lamp (Fig. 89).

A goodly supply of hand electric torches should be kept at the nurses' stations against need.

The Tungsten or Mazda lamp facilitates illumination, giving the maximum amount of light with a minimum amount of current.

For lights in the offices, kitchens, etc., nothing special is needed, except to secure a fixture which has simple lines and from which all dust-catching ornamentation is omitted and which will give proper illumination.

The therapeutic effect of the *color of walls, ceilings, and finish* is very marked upon patients. There is, perhaps, no one thing in the details of a hospital which should have more study than the wall and ceiling decoration or color, not only of the patients' rooms but also the entrance, the reception rooms, the sitting

room, and even the kitchens and work rooms. Why should the patient of refined taste, accustomed to harmonious colors in furniture and walls at home, be subjected to ugly, inartistic hospital rooms? The walls should be of cheerful colors; the decorations, if any, should be refined. It is well to have diversity of coloring both in the walls and equipment. If the walls are painted a reasonably dark color to a height of five or six feet, and the ceiling color brought down to meet this line, divided by a band or simple stencil design, the effect is very satisfactory. If the color design is carried around the door and window frames, making an artistic flat decoration, so much the better.

The introduction of tile and mosaic at the back of plumbing fixtures and radiators gives a touch of color and in addition an element of cleanliness. (See Fig. 49.)

The walls of the children's ward may be made most entertaining for the little folks by using simple decorations of "Mother Goose" or "farmyard" pictures, pasted on the walls in the form of a frieze and made permanent by a coat of varnish; or prints of larger pictures may be fastened to the wall in the same way; or, as mentioned in the chapter on children's hospitals, the walls may be decorated with Ceramic wall tile.

The day of white walls for *operating rooms* or any other rooms, let us hope, is past. The walls of the operating room, if of tile or marble, should not be white but of some tone which will not absorb too much light but dark enough to prevent eye strain on the part of the surgeon and attendants. If the walls are painted, the same argument will hold good.

Many surgeons today wish the floors and lower portion of their operating room a very dark green, and use dark gowns for themselves and attendants, for the same reason—to prevent eye strain and to allow a better concentration on the subject to be operated upon.

With reference to *nurses' calls*, too much cannot be said in favor of doing away with the noisy system of electric bells. There are many systems of the so-

called "silent call" on the market. All of them have merit. There are, however, essential points which should be considered in selecting a system:

1. The system should be simple and as nearly "fool-proof" as possible.

2. The part made accessible to the patient should be of non-metallic substance, with smooth lines, non-detachable and easy to operate.

3. The attachment to the wall should be of such a nature that if the connecting cable should be held by the bed-post and the bed suddenly moved, the entire system will not be disarranged; in other words, the "plug" to which the cord is attached should be readily removable, whether a straight or a side pull is exerted. This is a most important feature.

4. The resetting station should be within easy reach of the patient's bed; if on the wall, at such a height and location that the nurse can reset it without taking the time to go around the bed; if at the press-button itself, which is in the patient's hand, so much the better; but if the point of resetting is at the patient's hand, there should be some locking device so that the patient cannot easily cancel her own call.

5. The signal lights, if in a ward, should be shown over each bed, also at the entrance of the ward, at the nurses' station and at the grand annunciator in the superintendent of nurses' office. Together with the last mentioned, an elapsed time record can be kept, showing the time between any call and its cancellation. This is a device which always settles a dispute as to whether a call remained unanswered one minute (as the record might show) or ten (as the patient might claim).

A similar system may be installed for calling internes. The call is sent in from the main office and is flashed to different locations in the hospital. The interne, seeing his color or number illumined, calls the office from the nearest phone and gets his instructions. Signal lights

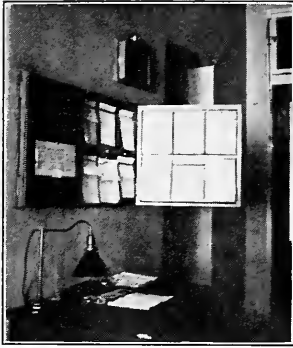


FIG. 359. WALL CHARTCASE.

for special calls, indicating special service, can also be arranged.

The loud-speaking telephone, with a sounder at convenient locations throughout the institutions, is now used to good advantage for calling superintendent or doctors.

Vacuum cleaners, it is the prevailing opinion, should be provided for every hospital of fifty beds or over, where power is available. The piping through the buildings can be very easily installed. There should be a sufficient number of outlets to make the work easy of accomplishment by the attendants, no point in any room being more than fifty feet from an outlet. Each outlet should be valved, so that the applying of the hose can be done with as little noise as possible. To that end, a special construction is desirable, making it possible to enter the hose before opening the valve, thus eliminating much of the noise.

There is some question about *nurses' stations*. Just where that of the head nurse of the floor or section should be is a question about which there is much discussion among hospital administrators—whether in a room adjoining the ward, in the open corridor, at a semi-glazed observation station, or in the ward proper. Dr. Rowe, the late dean of hospital superintendents, used to say that he believed the nurse on duty should be in sight of her patients as well as within hearing. In large wards the center-of-the-ward station may work out with the best results.

Wherever this station may be, certain

conditions and equipment should exist. The nurse should have a table or desk, with sufficient light for her work of charting and keeping her records. She should have facilities for writing her records and holding them after they are written. At this point, the nurses' call system should have its annunciator.

The writer believes that the charts, notes and standing orders for each patient should be kept together and that, as far as possible, those sheets should be of uniform size.

The writer has found the most suitable chart-holder to be made of heavy manilla paper, with the tops folded so as to enclose the top ends of all the papers, all held in place by regular ring paper clips. If the charts are to be hung, each chart is punched in the right spot for hanging; if placed on shelves, the punching is not necessary. These chart-holders are light, serviceable, and noiseless. A nurse, in going through the wards with the doctor, can take in her hands the charts for the whole ward, having them ready as the patient is ap-

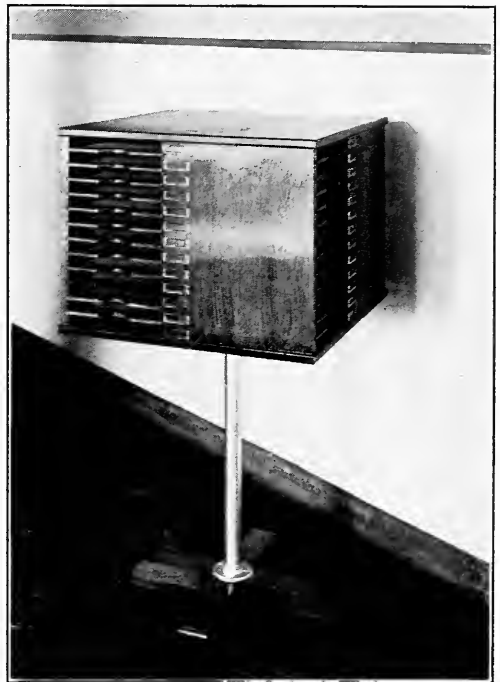


FIG. 360. REVOLVING CHARTCASE.

proached. In this way they are always kept away from the patient, whereas if the chart is left on the bed it is available to the inquiring mind of the visitor and of the patient himself.

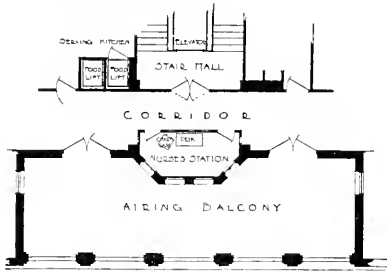


FIG. 361. PLAN OF NURSES' STATION.

Various methods for holding the charts in readiness for inspection are employed—one, the chart-case opening like a book

with one cover against the wall, which, when open, discloses all the charts to view at one time (Fig. 359); another, the desk with "pigeonholes" for each chart-holder; a third, adopted by the writer for use where there are a large number on one service, built on the principle of revolving book-case, with the center of the case placed on a level with the nurse's desk, so that without rising the nurse can reach any chart (Fig. 360).

Where a room for the nurses can be provided, this should be central. The station shown (Fig. 361) illustrates an ideal nurse's station, for from this station the nurse controls not only the corridor, but the stair hall, the elevator, the patients' airing balcony and the serving kitchen entrance; with the use of the telephone, she is in touch with all departments.

CHAPTER XVII.

Equipment

The question of hospital equipment is fraught with nearly as many perplexities as the planning of the buildings. The question of the best bed, the best food wagon, the best operating table, or the best wheel stretcher is constantly met. There seems to be no general rule which will apply except this, that the simpler the lines of the apparatus or article which will accomplish the purpose with the greater conservation of energy of those using it, the better the equipment.

The ordinary dealer in hospital equipment tries to sell the wares which he has in stock, and is not anxious to have special designs ordered; but many times, in order to get the best results, it is necessary to have equipment specially made. It is true that the greater part of the equipment can be standardized, but it is equally true that much improvement remains to be made in some of the present standards.

Discussion of equipment may properly consider first the furniture of the patient's own room, beginning with the *bed*. This must first of all be comfortable for the patient; it must be of the right height to make work easy for the nurse; it should have extension legs to allow of being raised at either end without blocks; it must be easy to move, yet stationary when required; it should have an adjustable back rest, a bar at the foot to take care of the extension in leg fractures, a detachable irrigator staff, and crosswise bars at the head whereby the patient may lift himself or get mild exercise. Full Gatch or Fowler position frames, built into the bed, can be used to great advantage.

To facilitate moving the bed, various forms of bed trucks are in use; that designed by Dr. Mackintosh of the Western Infirmary, Glasgow (Fig. 365), provides for a fixed foot, with large casters

on the head end; when the patient is to be moved, the nurse or orderly throws a lever at the foot of the bed, forcing down a fifth leg with large caster, thus raising the foot of the bed from the floor. This leaves the bed on three large casters, ready to be moved with the slightest effort. A similar bed is now manufactured by American makers (Fig. 366). The single staff bed truck, used in a similar way, is quite effective (Fig. 367).

A fracture bed having a certain

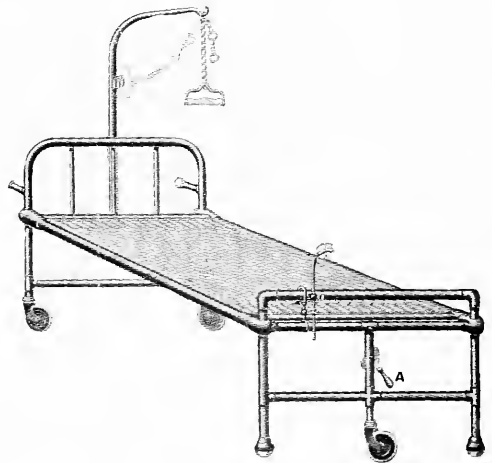


FIG. 365. MACKINTOSH BED ADJUSTER.

amount of resilience is now made with steel slats or carriage springs. The most popular is the open pattern, which is easily cleaned and adjusted.

The two-piece maternity bed, which allows for the removal of the foot half and adjustment of the stirrups, is generally coming into service in maternity hospitals. The illustration (Fig. 368) is that of a bed found by the writer in Berlin in 1913. American manufacturers, however, have improved on this in many details (Fig. 369).

The *bedside table* is perhaps the next in importance in the patient's outfit; for, in the ward, it contains prized possessions, and is subject to many uses. Its contents should not be subjected to the gaze of the occupant of the next bed; at the same time it should be open enough for good ventilation. It should be adjustable so as to serve for an "invalid" or over-the-bed table (Fig. 370); another type shown (Fig. 364) fastens directly to the bed and requires no floor space. For private rooms not connected with private baths, the utilities such as bed-pan, bowl, pitcher, etc., may be arranged on the doors of a bedside cabinet and so kept out of sight.

In the private rooms the furniture should be refined and simple in lines, open underneath to facilitate cleaning. Plate glass tops placed over scarves of

the same material as furniture covering or curtains help to bring the room into harmony. Chairs, of course, should be comfortable; if upholstered, they should have removable covers.

Footstools are always desirable. Those made similar to the Pullman car porters' stools have the advantage of stability (Fig. 372).

For mattresses, nothing has been found more comfortable than a good quality hair. Both hair and feather pillows should be provided; and the small "comfort" pillow or bolster, about five inches in diameter and eighteen inches long, often eases the aching back or relieves the pain of a fractured limb and is also of great service in the maternity department.

There might be added to the private room a good picture or two. Hung with

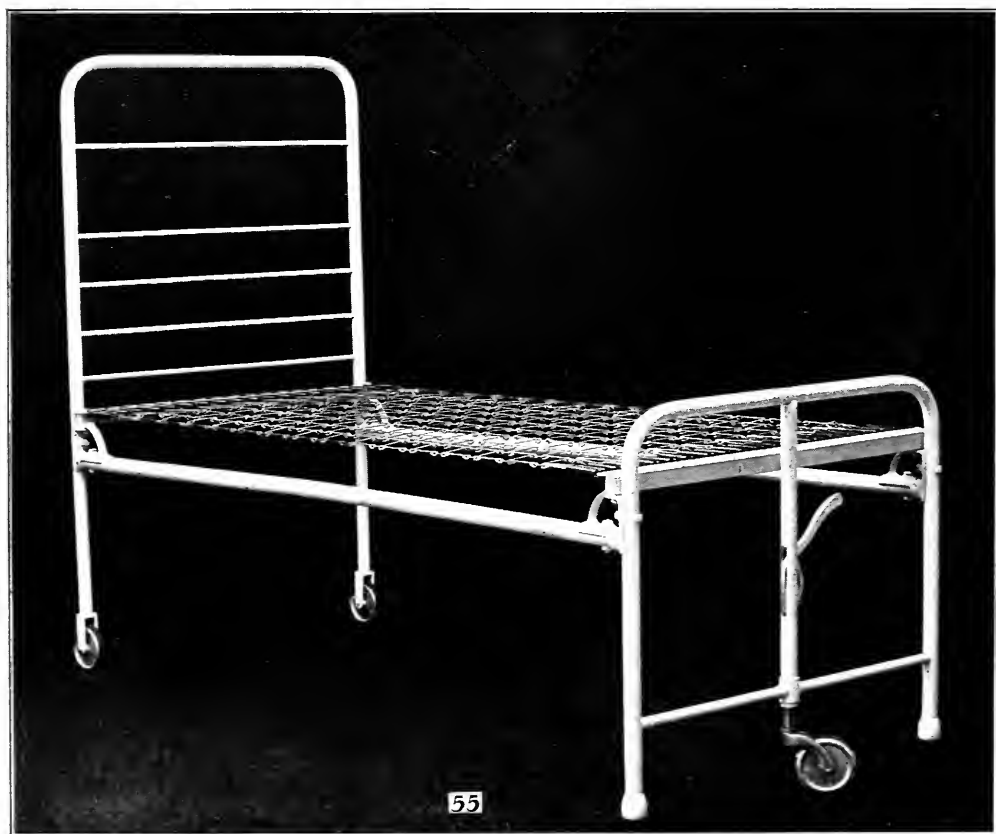


FIG. 366. FIXED BED TRUCK.

a short cord directly from the back, they are easily taken down for cleaning.

A rug, preferably washable, may be added with good effect.



FIG. 367. PORTABLE ONE-PIECE BED TRUCK AND IRRIGATOR STAFF.

The hangings for the windows also should be washable.

Care of patients' clothing might well be discussed here. In some hospitals, the clothing of the ward patients is carefully put into individual lockers and the keys turned over to the patient, although he himself never sees the lockers; in others, "pigeonholes" or small bins are provided for each; and in still others, the clothing of one patient is hung side by

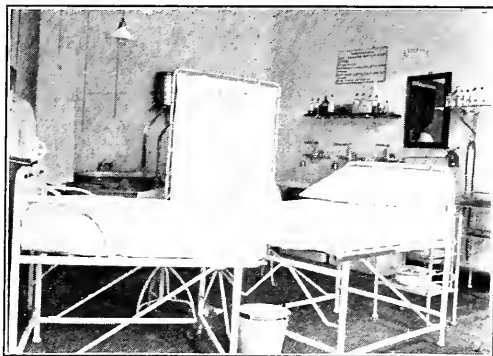


FIG. 368. TWO-PART MATERNITY BED, EUROPEAN MAKE.

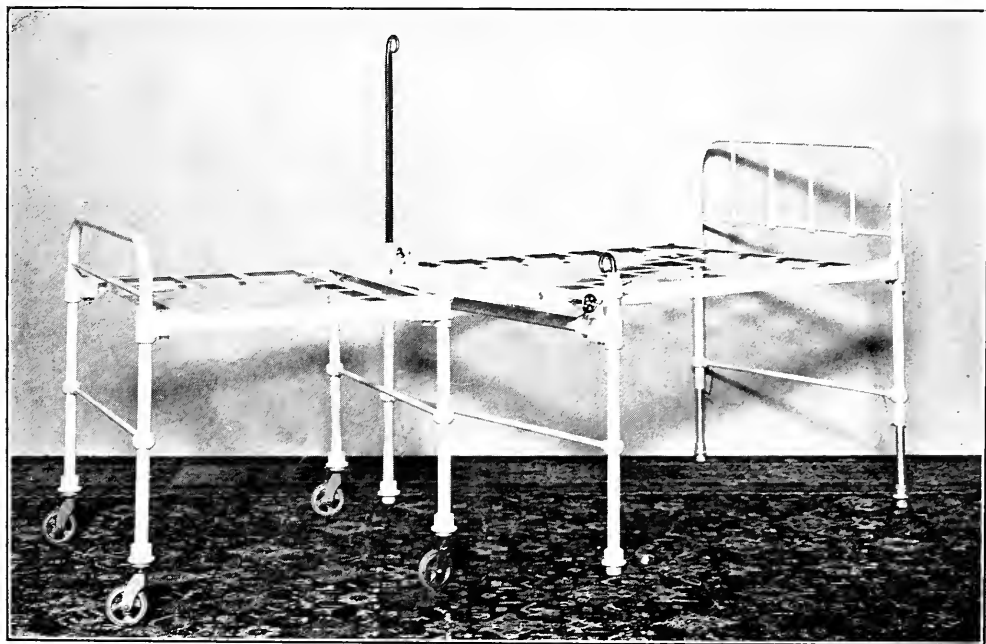


FIG. 369. TWO-PART MATERNITY BED, AMERICAN MANUFACTURE.

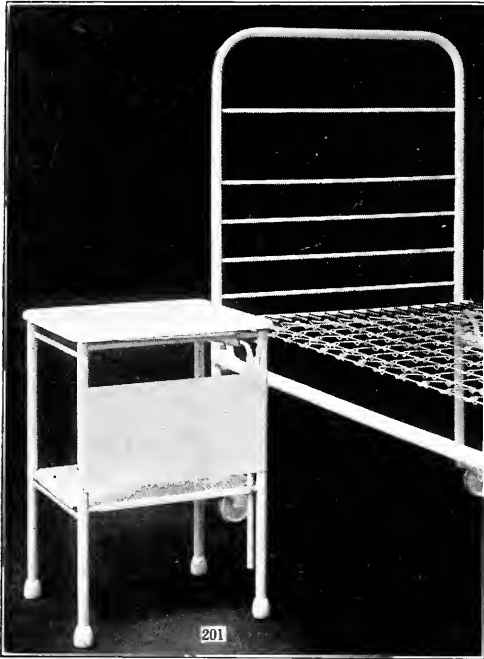


FIG. 370. ADJUSTABLE BEDSIDE TABLE.

side with that of others in a clothing room.

The method adapted by the writer from the system used in the Munich-Schwabing Hospital (Fig. 373) is that of cloth lockers or bags of sufficient size to hold the clothing without folding. The

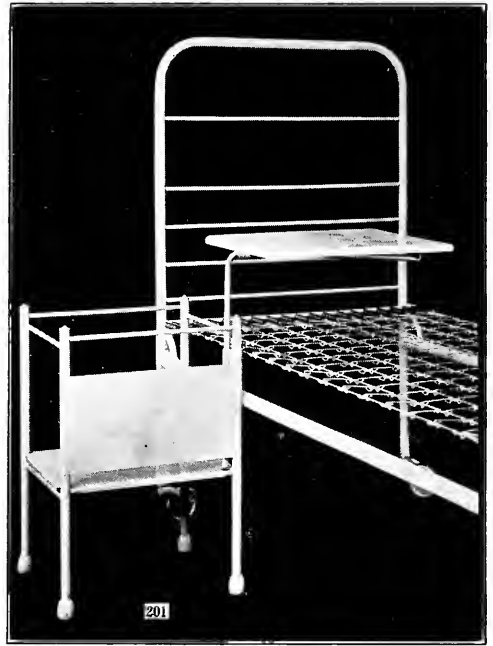


FIG. 370A. ADJUSTABLE BEDSIDE TABLE, WITH TOP EXTENDED OVER BED.

bag is oblong, about eight by sixteen by fifty inches high, and is held in place by wire grilles at top and bottom; from the top grille a hook extends through the top of the bag and serves to hang the bag to the pipe rack erected for the purpose; from the top grille is suspended a garment hanger, with additional hooks for small garments. The bottom grille serves to hold shoes and small articles. The clothing can be placed in this bag by the patient, in the admitting room, and taken to the clothing room on a truck provided for the purpose (Fig. 374).



FIG. 371. PORTABLE BEDSIDE TABLE, ATTACHED TO SIDE OF BED.

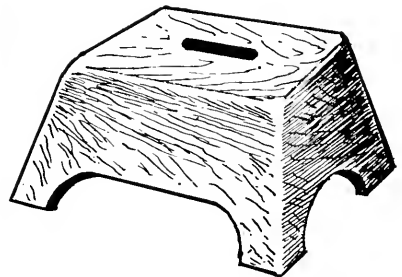


FIG. 372. PATIENT'S FOOTSTOOL.

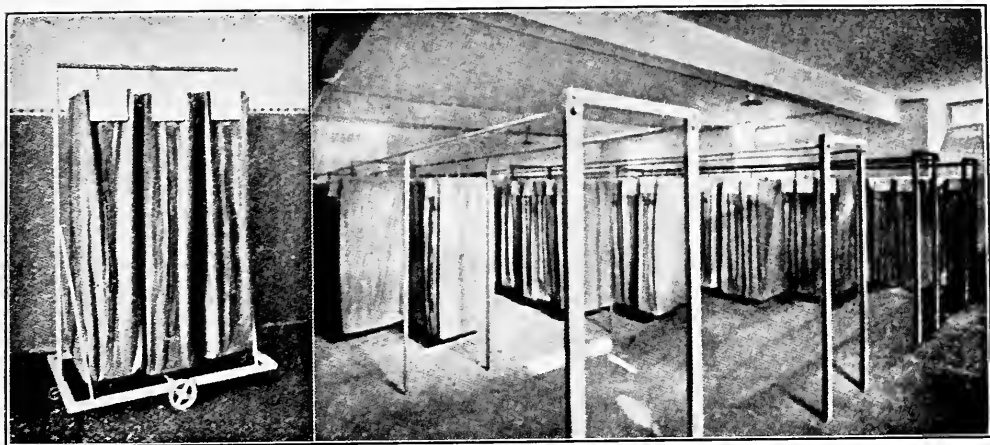


FIG. 373. CLOTH LOCKERS FOR PATIENTS' CLOTHING.

Great care should be taken in equipping the *operating department*.

Sterilizers for hospital uses have, to a certain extent, become standardized and are manufactured by numerous specialists in that line. The selection of the best is oftentimes a matter of personal judgment, but as with other hospital utilities there are certain underlying principles involved, whoever makes the apparatus.

In the dressing sterilizer one should

be able to sterilize all dressings, sponges, and other goods needed in the operations, and have the same dry, ready for use. To do this, a steam pressure of about fifteen pounds, for a sufficient length of time, or super-heated air, or both, is necessary. The size of the apparatus depends on the needs of the institution. In America the most common forms are the horizontal cylindrical and the globular; while in European hospitals the vertical cylindrical type or the

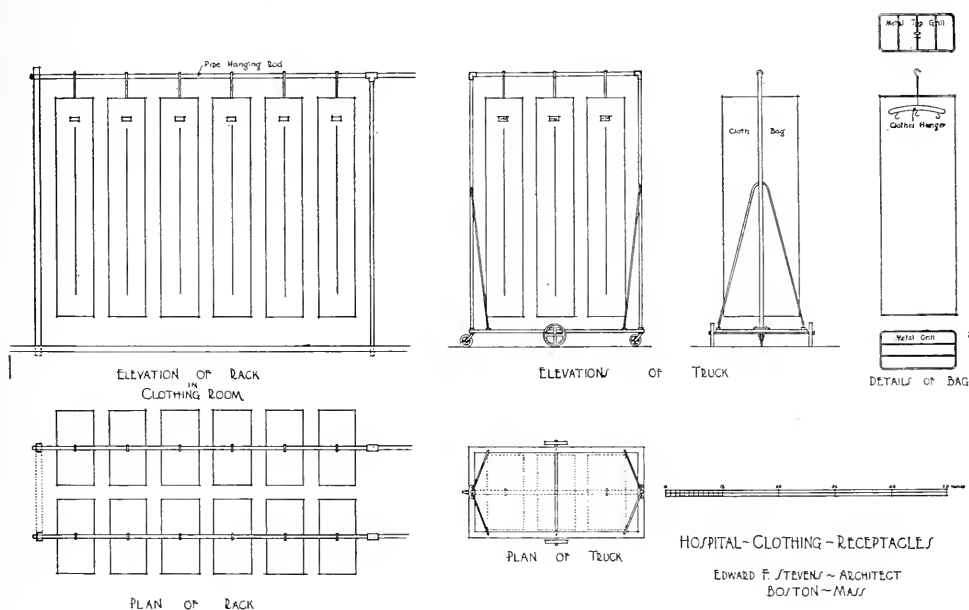


FIG. 373A.

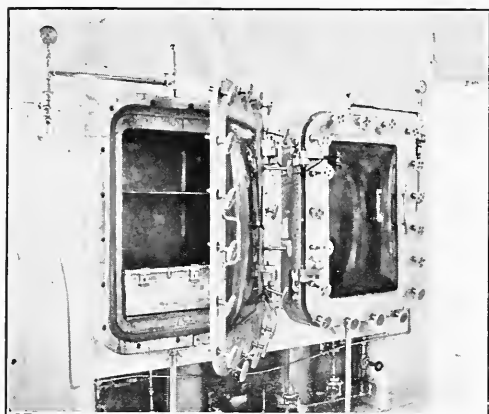


FIG. 376. BOX STERILIZERS, BUILT INTO WALL. OPEN.

cabinet form is used. A shape which admits of baskets or semi-closed boxes facilitates handling the dressings. The box sterilizer shown in Figs. 376 and 377, recently erected in the Royal Victoria Hospital, has some advantages over those of the same type found in Europe—principally in that the air is superheated and steam, at a less pressure than formerly, is introduced. The bacteriological tests, however, show absolute sterility.

The sterilizers for basins should be of sufficient size to hold what will be needed in an operation and should have an automatic lift both for cover and tray, either foot power or hydraulic.

For instruments, gloves, etc., smaller sterilizers may be used, but the same principles should prevail as in the larger.

A tank for saline solution, with thermostatic control, is a desirable addition.

The sterile water to be used in dressing, in irrigation, or for cleaning the hands during operation, must be most carefully prepared.

Bacteriologists assert that all of the harmful life is not destroyed at one boiling; but that to obtain absolute sterility, the process must be continued for three consecutive days, and even then, with careful filtration, minerals and solids are not removed. If they are right, safety to the patient will not permit the use of anything but distilled water for operation purposes. The water stills have become

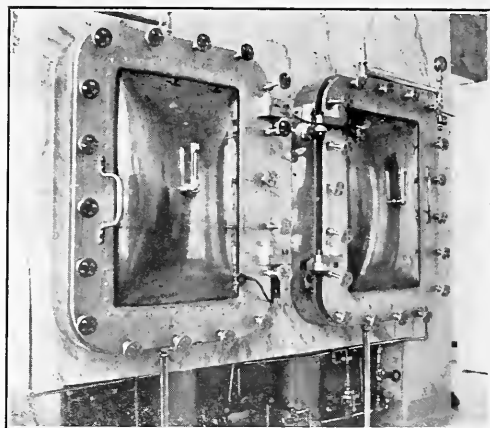


FIG. 377. BOX STERILIZERS, BUILT INTO WALL. CLOSED.

standardized to such an extent that stills of almost any size can be procured in the market.

If sterile water is needed in a number of different parts of the institution, it is more advantageous to place the water still and receiver in an elevated position, conducting the distilled water by gravity through tin-lined pipe to the various points needed, where a local instantaneous heater can be located, with steam or electric heating unit. Water from the same still, through a separate storage tank, can be used for drinking purposes for the institution, as in the Royal Victoria and the Ohio Valley General Hospitals.

It often happens in small hospitals that no high pressure steam or gas is available for heating sterilizers. Electricity or even kerosene oil can be used.

The equipment for the operating rooms should be governed by the needs of the surgeons. A table with the numerous necessary adjustments, instrument and utensil tables, stools for both surgeon and anaesthetizer, and receptacles for soiled dressings are among the necessary items. If the room is fitted for compressed air, nitrous oxide gas, oxygen, and steam, the work of the surgeon is facilitated.

Cabinets for dressings, instruments, and blanket warming, either built-in (as in Fig. 83) or portable, are necessary in the operating equipment.

The newer type of alcohol dispensers.



FIG. 379. SECTION OF SINK ROOM.

where only so much liquid as is needed is released by foot pedal action, is considered an economy, and in using this no two persons immerse their hands in the same fluid (Fig. 82).

Demand for a room where the dirty work of the ward unit can be done has developed what is commonly termed a *sink-room* or work room. In the older hospitals one will find no such room, and the work now being done in this room was usually done in the toilet room, with the bed-pans and urinals placed on the walls or wherever there were a few square inches of space. The need of such a room is great. Here not only are the bed-pans discharged, washed and

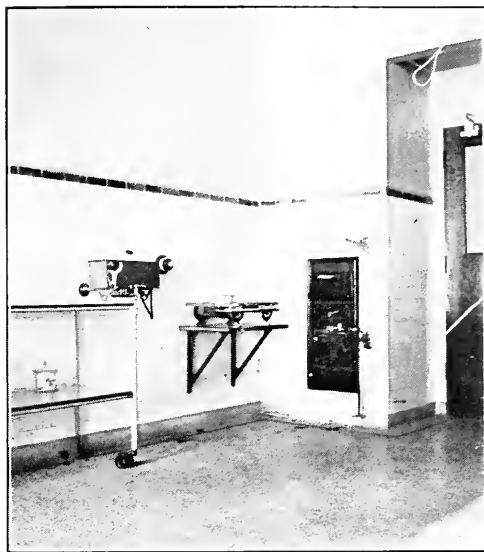


FIG. 380. SECTION OF SINK ROOM, SHOWING STERILIZER AND INCINERATOR.

sterilized, but there should be a place for the preservation of specimens in a cool, ventilated space, opportunity for the boiling of catheters, making of poultices, etc.

There should be a local incinerator in this room for the destruction of all ward waste, faded flowers, etc. (Fig. 380.) There should be a sink for the washing of rubber sheets and utensils, and an ice-box for crushed ice; in short, this should be a room which can be the general work-room of the section.

If there is no local laboratory, this room will often serve the purpose.

The *disinfecting room* in the general hospital should have either a steam pressure disinfecter or a hot-air and formaldehyde disinfecter, or both, and room for the storage of mattresses after disinfection.



FIG. 383. AUTOMATIC LIFTS FOR FOOD CARS.



FIG. 388. OPEN FOOD TRUCK.



FIG. 382. OHIO VALLEY GENERAL HOSPITAL. SERVING KITCHEN.



FIG. 381. ST. LUKE'S HOSPITAL, NEW BEDFORD, MASS. SERVING KITCHEN.



FIG. 384. BRIDGEPORT HOSPITAL. DIET KITCHEN, SHOWING CABINET FOR HOT AND COLD DISHES.

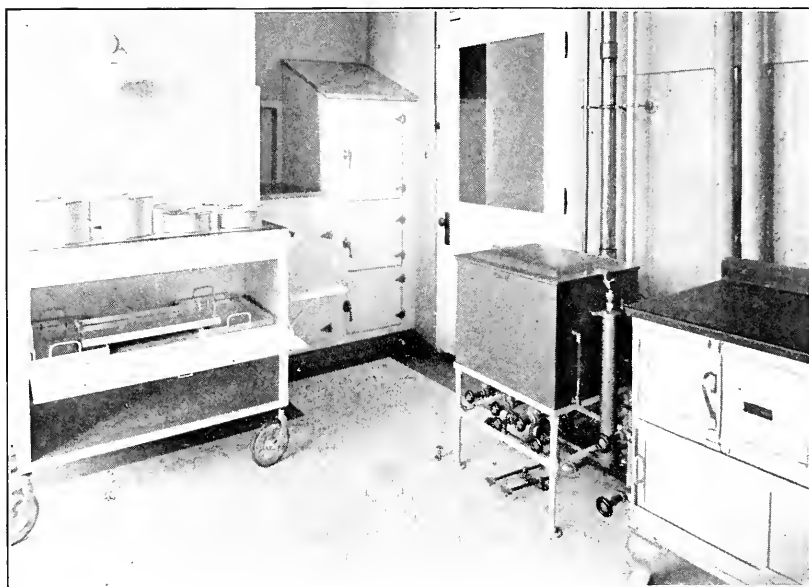


FIG. 387. CINCINNATI GENERAL HOSPITAL. SERVING KITCHEN, SHOWING FOOD TRUCK.

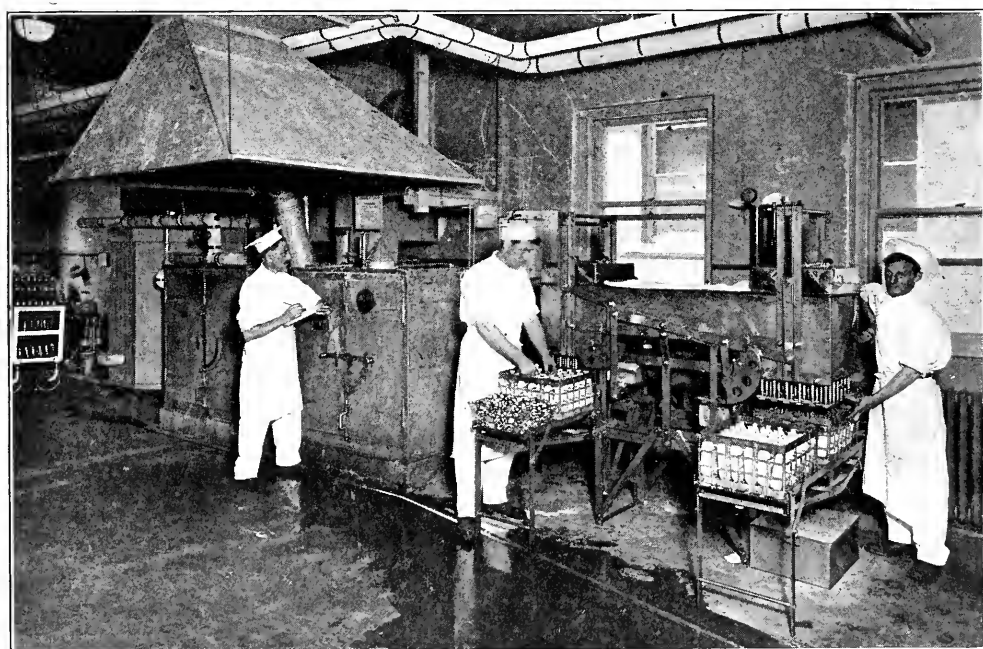


FIG. 389. HOSPITAL FOR SICK CHILDREN. PASTEURIZING ROOM.

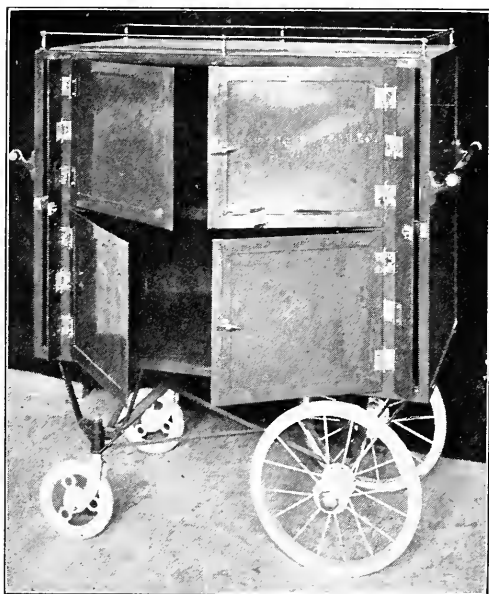


FIG. 385. HEATED FOOD TRUCK.
Heat is applied by inserting hot soapstones in
pockets at sides.

CHAPTER XVII.

Landscape Architecture as Applied to Hospitals

There are greater possibilities for the care of the convalescent in suitably planned grounds around a hospital than within the walls; and when locating the buildings for a suburban hospital especial accessibility to the grounds should always be considered.

Wherever one goes in any of the larger institutions of Europe, one will see the convalescent patients walking or being wheeled along the shady paths, sitting under special arbors or awnings, enjoying the green grass and the flowers, and chatting with one another. Comfortable benches and easy seats, splashing fountains, and simple forms of amusement, all add to the pleasure, and shorten the convalescence. Walks, with frequent benches for resting, should be provided. At the Virchow Hospital (Fig. 1), several acres are devoted to the park in addition to the well laid out and well equipped grounds of the hospital. In this park the staff, the nurses, the male and female patients are allowed, but on different days; so that it becomes a private park for the enjoyment of all. (See Fig. 400.)

In selecting the site, not only the exposure and the protection from cold winds should be considered, but the views from the hospital, the possible vistas from the wards or balconies. If the outlook is depressing in one direction, it should be screened by a slight change in the location or by planting out the view.

The site selected may have most beautiful trees which the hospital authorities demur about having cut; but if the buildings cannot be placed to advantage without this cutting, then the test applied by some landscape architects—"If the tree were out of the way, would you wish one in that place?"—is a very good one to apply.

Runways of easy grade from the floor level to the ground are always desirable.

The planting should be carefully planned under the direction of some landscape architect of ability, so that the trees, the shrubs, the grass, and the flowers bear the right relation to one another and to the architecture of the building. Shade should be provided where shade is needed, and care exercised not to plant too near the building so as to cause too much shade; shady walks are desirable, but shaded buildings never, for with the shade comes dampness and chill, therefore sunlight should reach the buildings wherever possible.

The tendency of many landscape architects to mass shrubbery against a building, leaving the building as a background, while it may enhance the beauty of the architecture or sometimes hide it, is very apt to shade a portion of the building which needs the sunlight. It is as true in landscape planning as in building planning that the patient must be considered, and the therapeutic and healing benefits of the sun's direct rays must outweigh the architecture; for, as was said in another chapter, the hospital is built for the patient and not for the glorification of the architect or his running mate, the landscape architect.

In the laying out of the patients' lawn or patients' court, the planting should be so arranged as to act as a screen from the public, as shelters to benches, and as shields against the prevailing cold winds.

Fountains and pools, a rustic bridge and aquatic plants, if space and facility admit, and plenty of green grass add materially to the interest. If there are grades, these grades should be gentle, for the convalescent must be encouraged. All these things help the patients who are just recovering from an operation or convalescing from a fever to enjoy God's great out-of-doors.

Just a few examples by way of showing how some institutions have cared for

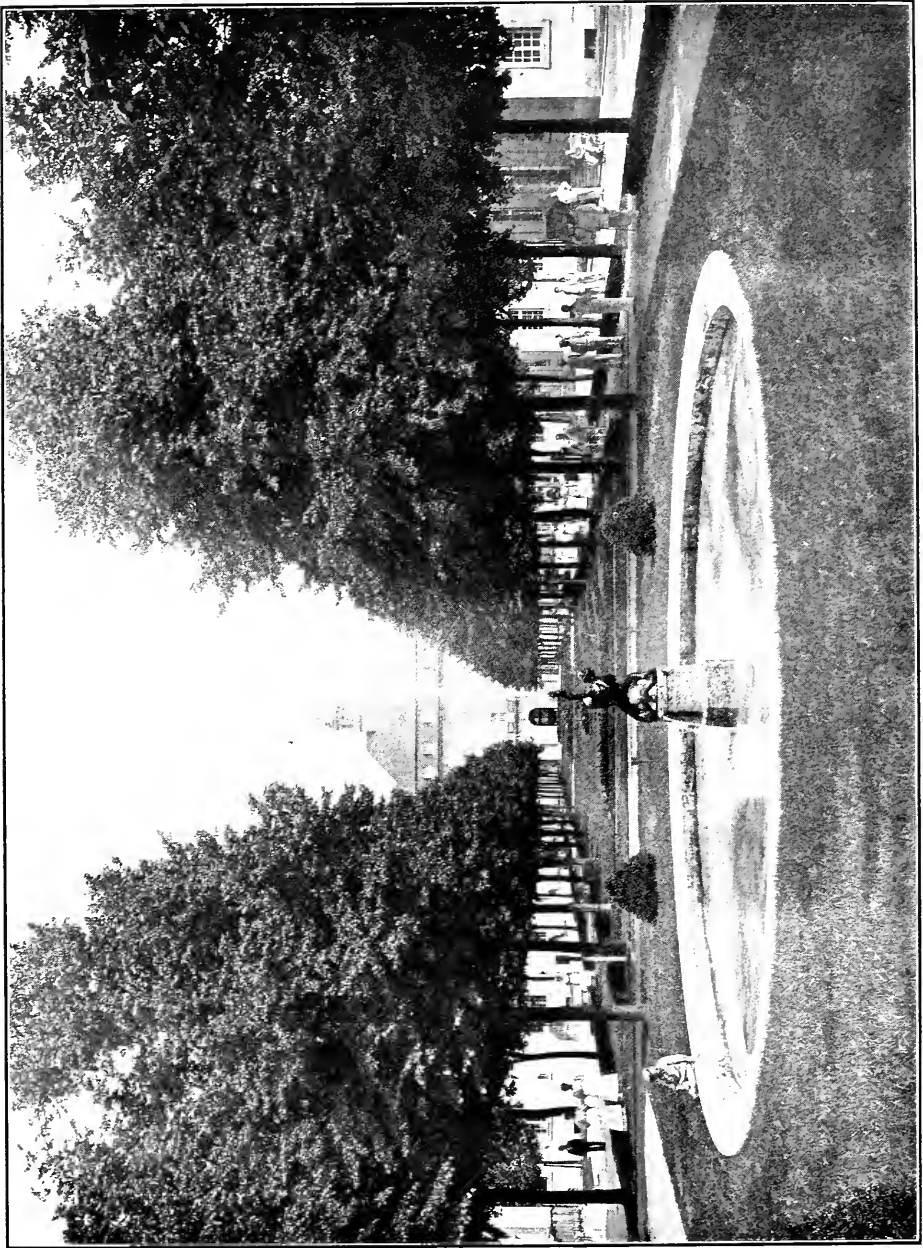


FIG. 400. VIRCHOW HOSPITAL, BERLIN. VIEW IN GROUNDS.

the artistic effect as well as for the comfort of the patient:

In the general plan for the *Newton Hospital* (Figs. 401-407) will be seen a development extending over a score of years. When expansion was necessary more land was acquired, buildings altered

and moved, and the scope of the plant increased. The whole group was brought into greater harmony by a careful study of the landscape possibilities, which were carried out under the able direction of Mr. Herbert J. Kellaway. Roads were changed, walks created, objectionable



FIG. 403. NEWTON HOSPITAL. FOUNDERS' MEMORIAL.
Kendall, Taylor & Stevens, Architects.

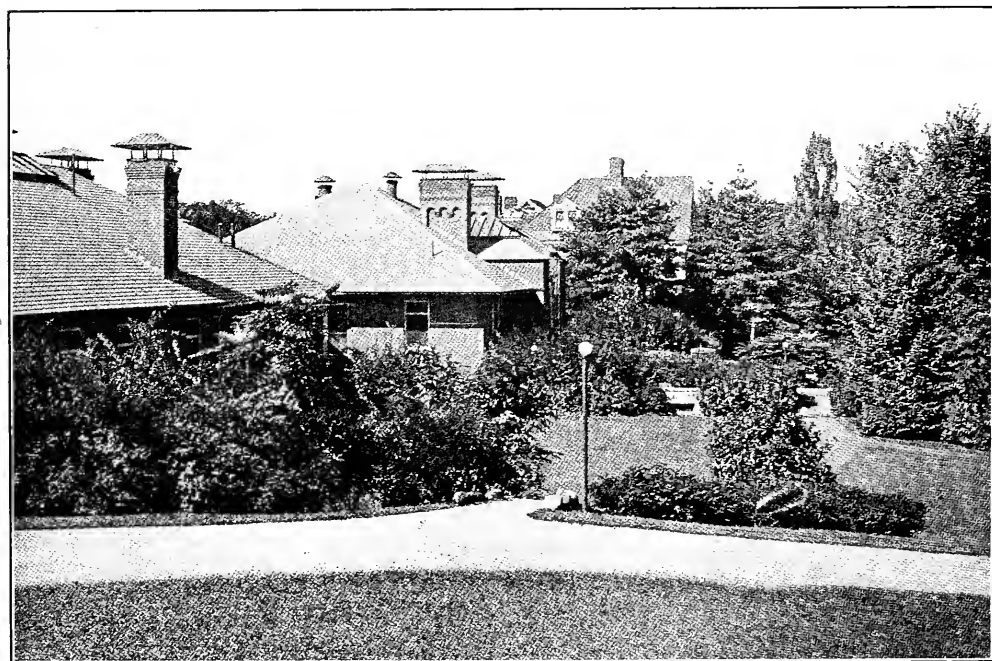


FIG. 404. NEWTON HOSPITAL. GROUP VIEW.
Kendall, Taylor & Stevens, Architects.

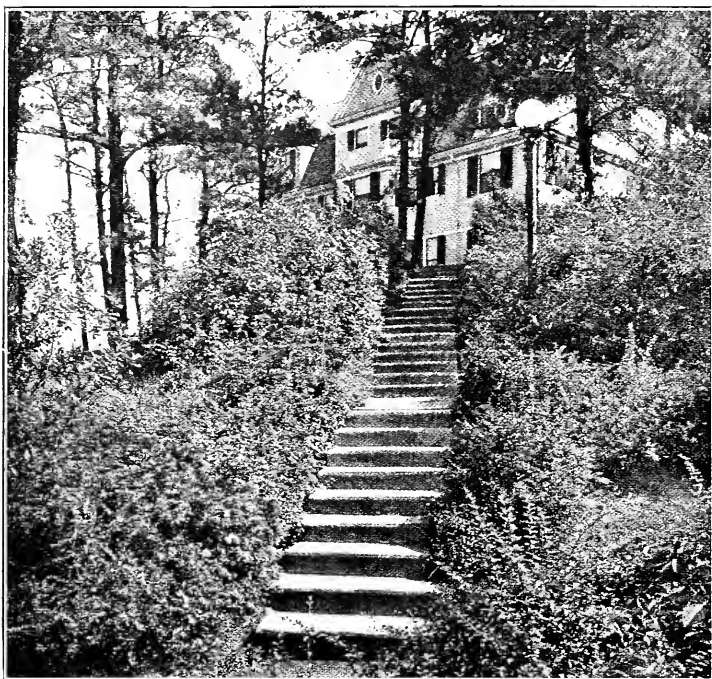


FIG. 406. NEWTON HOSPITAL. PATHWAY TO NURSES' RESIDENCE.
Herbert J. Kellaway, Landscape Architect.

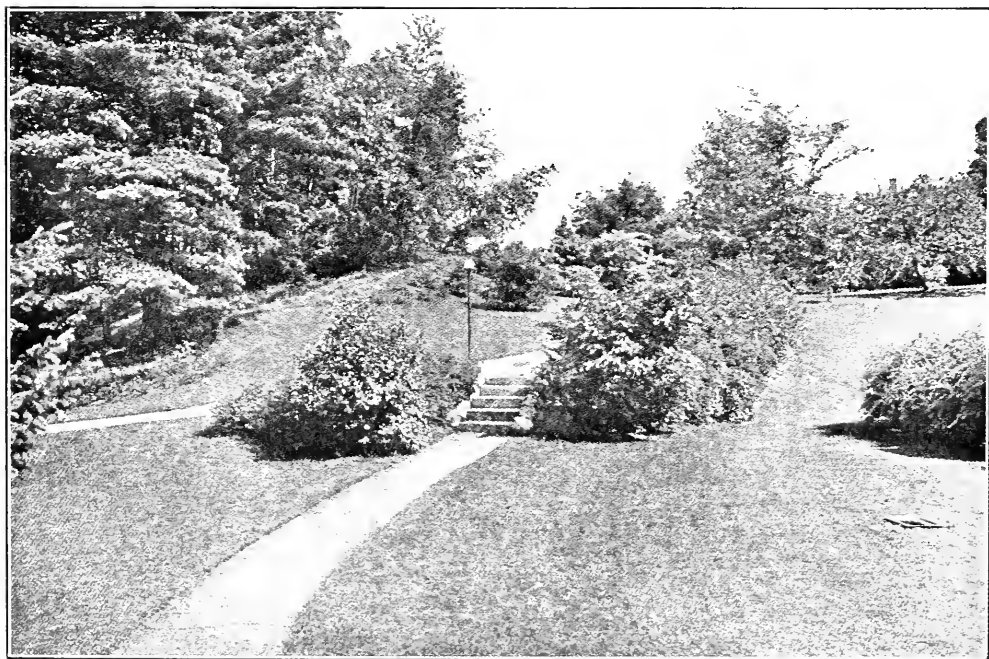


FIG. 405. NEWTON HOSPITAL. VIEW IN GROUNDS.
Herbert J. Kellaway, Landscape Architect.

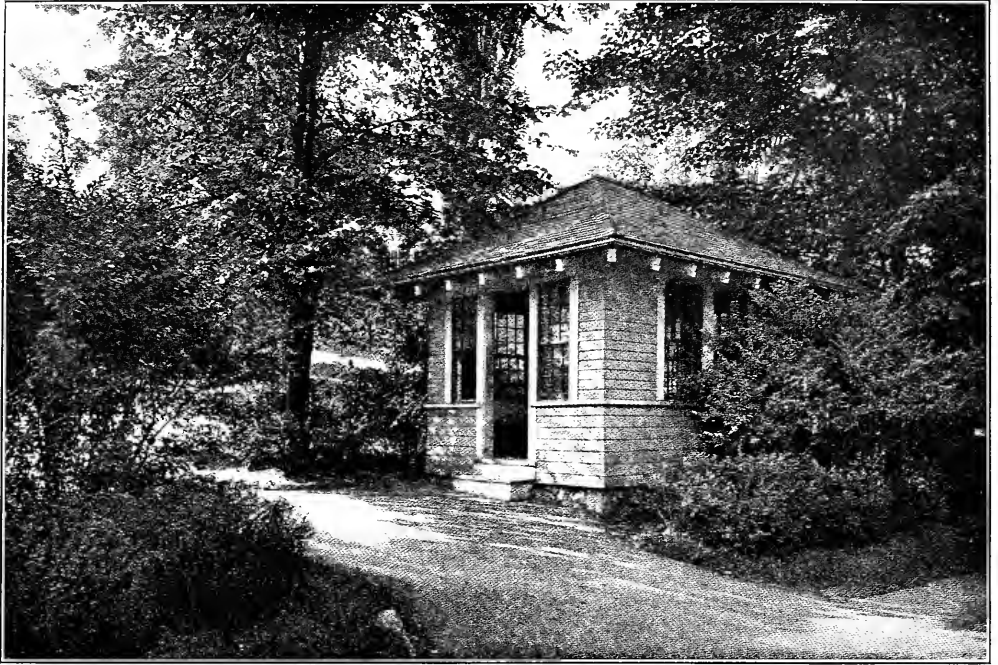
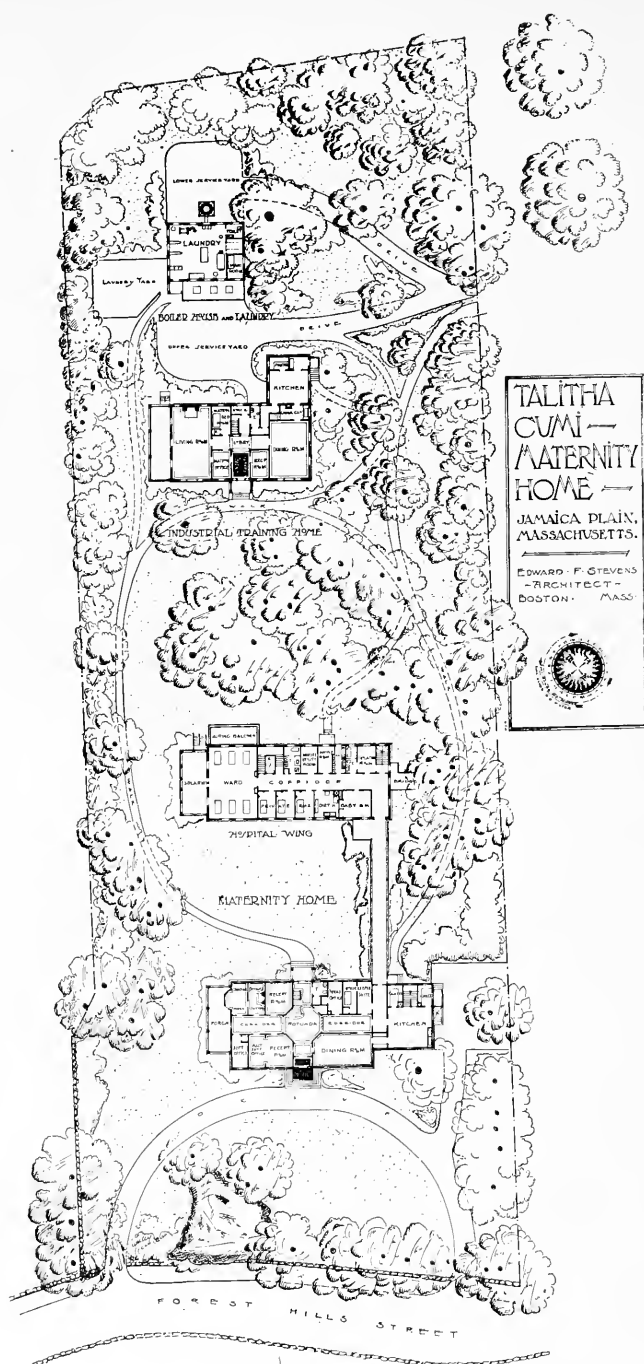


FIG. 407. NEWTON HOSPITAL. WAITING LODGE.



FIG. 407A. NEWTON HOSPITAL, GROUP VIEW.
Kendall, Taylor & Stevens, Architects.



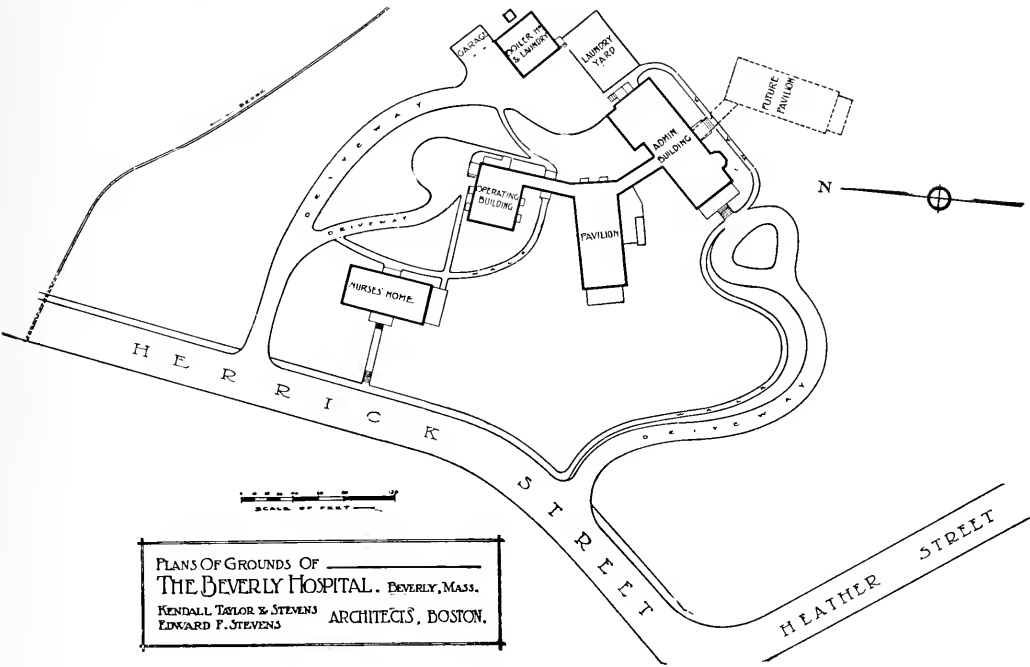


FIG. 409.

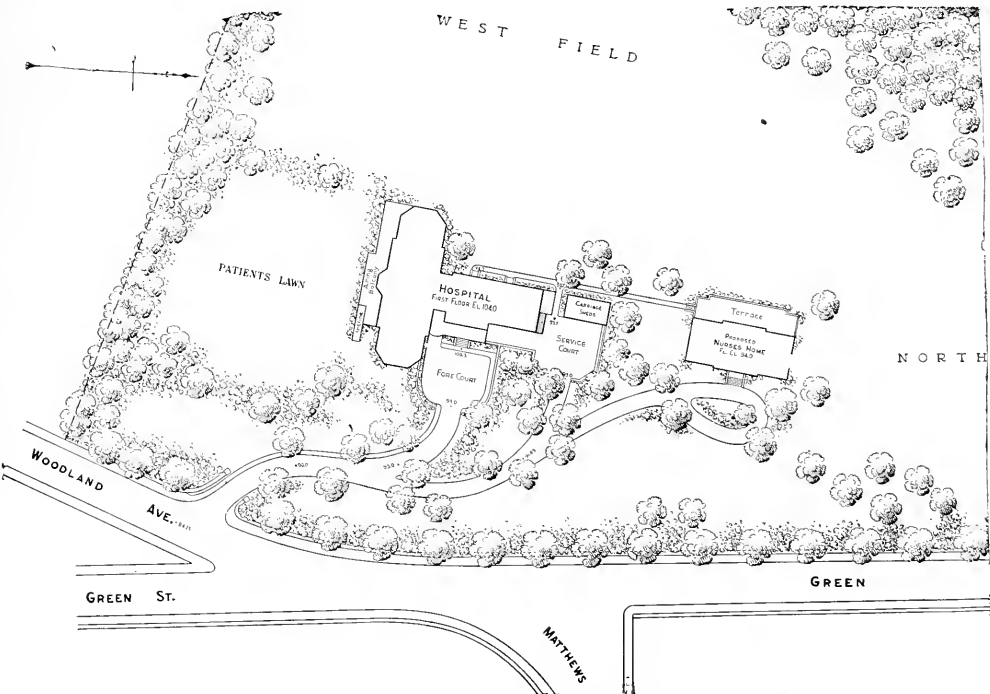


FIG. 410. HEYWOOD MEMORIAL HOSPITAL, GARDNER, MASS.
Kendall, Taylor & Stevens, Architects.
Herbert J. Kellaway, Landscape Architect.

the same time screen the patients from the view of approaching carriages. Study was made of the approach of service drives to kitchen and morgue.

The site selected for the little hospital at Ipswich, the Benjamin Stickney Cable Memorial Hospital (Fig. 411), was in the beginning a barren field; and the problem given to the landscape architect, was to re-create the site by planting trees and shrubs, to make an easy approach to both front and ambulance entrances, to make an approach from the street car line to the building, and at the same time to screen all of these approaches. The high wall of the

patients' court and the location of the airing balconies made this possible. This patients' court has private walks and pavilions and seats for the convalescents.

With the city hospital on restricted land, small opportunity may exist, but what little there is to be done should be considered wisely. One rarely sees a more charming approach to a city hospital than that to the Phipps Psychopathic Clinic at the Johns Hopkins Hospital.

If the architects can make the approach to their hospitals speak the welcome that they try to express in the entrance to the buildings, they will go a long way toward expelling the fear of entering an institution.

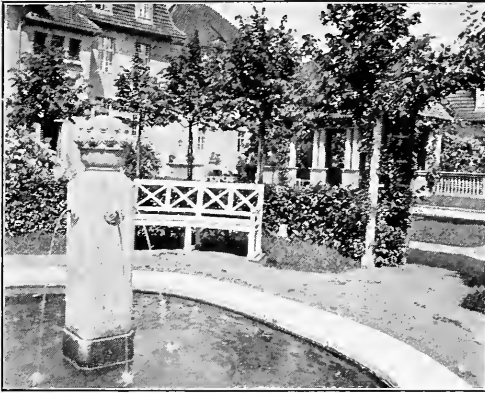


FIG. 412. AN OLD PEOPLE'S HOME. VIEW OF GROUNDS.



FIG 413. PORTABLE SEAT, WITH AWNING.



FIG. 414. ROYAL VICTORIA HOSPITAL, ROSS PAVILION. ENTRANCE GATES.
Stevens & Lee, Architects.

CHAPTER XIX.

War Hospitals

In this volume, the writer has merely touched on a few of the many hundred hospitals which have been erected in America since the beginning of the century and has tried to point out a few of the general examples of European institutions and to show how hospital improvements in planning and technique have been carried out in America.

This volume would not be complete without touching, at least, on the hospitals already built for war purposes.

During the past season, the United States has, through the Medical Department and the Quartermaster's Department, erected large hospitals at each cantonment and National Guard encampment. These hospitals have been con-

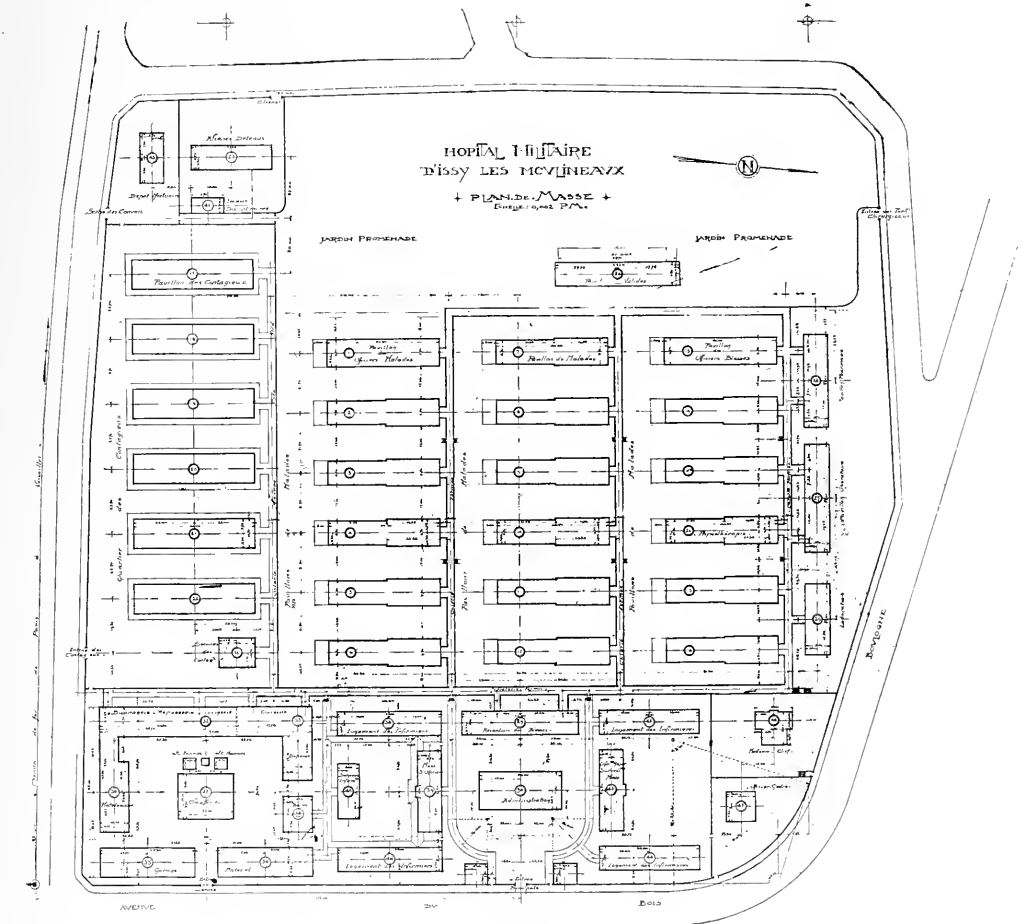


FIG. 420.
Charles Butler, Architect.

structed of wood, are one story in height, and each hospital comprises a group of about sixty buildings, connected by enclosed corridors. Each ward accommodates thirty-two patients.

In France and England, however, we find plenty of good examples. The field hospitals are largely of the portable "knock-down" construction. About the cities, however, many permanent new hospitals have been and are being built.

In the war hospital at Issy-les-Moulineaux, near Paris, France, Mr. Charles Butler, an American hospital architect, working with the American Clearing House in Paris, with French military engineers and architects, has developed a plan embodying the good points of the American as well as of the European institutions. Mr. Butler's own description of the hospital follows:

"The permanent *Military Hospital* at Issy-les-Moulineaux (Figs. 420-428) is planned to contain five hundred beds, of which approximately two-thirds are for sick and wounded, and one-third for contagious diseases.

"The site is a high plateau, with a slight slope toward the north. The general entrance lies on the east, the Administration Building being close to the road, while behind it lies the Reception Building, which in a war hospital is even more important than in an ordinary one.

"The wounded arrive by automobile ambulances and are taken into the Salle de Reception, the stretchers being placed in a row in the back of the room, and benches being provided for seated cases. After rapid examination by the surgeon in charge, the wounded pass to the Salle de Nettoyage or clean-up room, where their soiled clothes are removed and they are bathed on high flat tubs. Meanwhile their valuables are checked, soiled clothes go into the soiled clothes' wagons and clean linen is provided from the adjacent linen room. With this system every man reaches his ward clean and with clean linen, although, in general, no new dressings have been attempted, except where a bandage may have become loose or has slipped out of position.

"At the other end of this building is

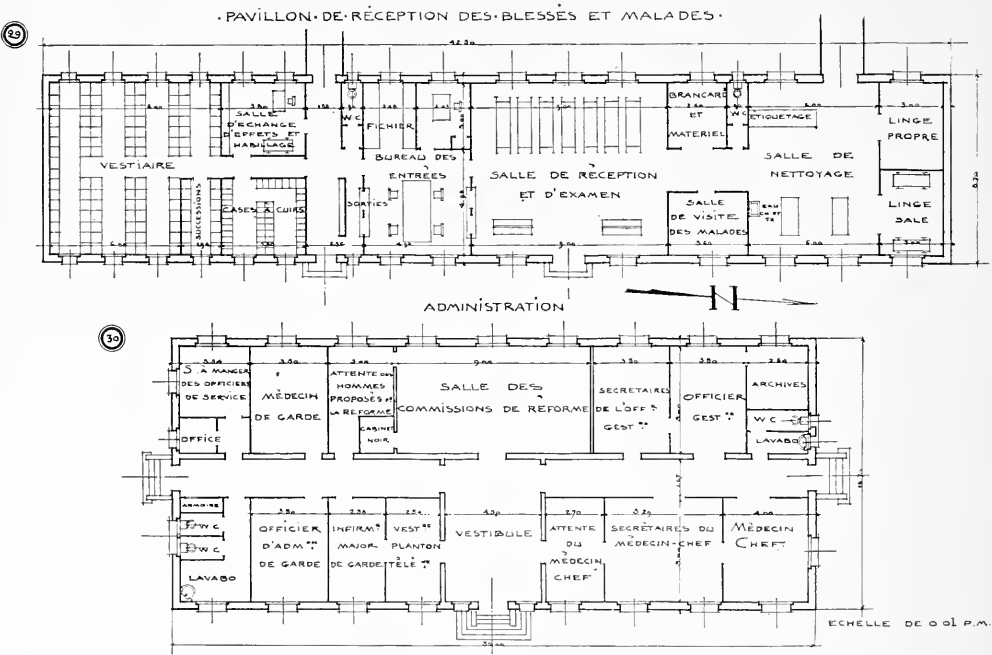


FIG. 421. MILITARY HOSPITAL AT ISSY-LES-MOULINEAUX.

the storage room, where what is mended of the uniforms come back after disinfection, and between the store room and the receiving room is the file room for records, etc., where the discharged soldier passes to secure his belongings before leaving the hospital.

"The reception pavilion is connected to the different pavilions of the hospital by covered ways enclosed in glass and

heated so that the wounded man, after being washed up, does not go out doors to reach the ward to which he has been assigned.

"The general arrangement of the wards is on the north and south axis, the corridors giving entrance to the north end of each ward, while the south end is very open, giving the greatest possible amount of sunlight. At the south end of

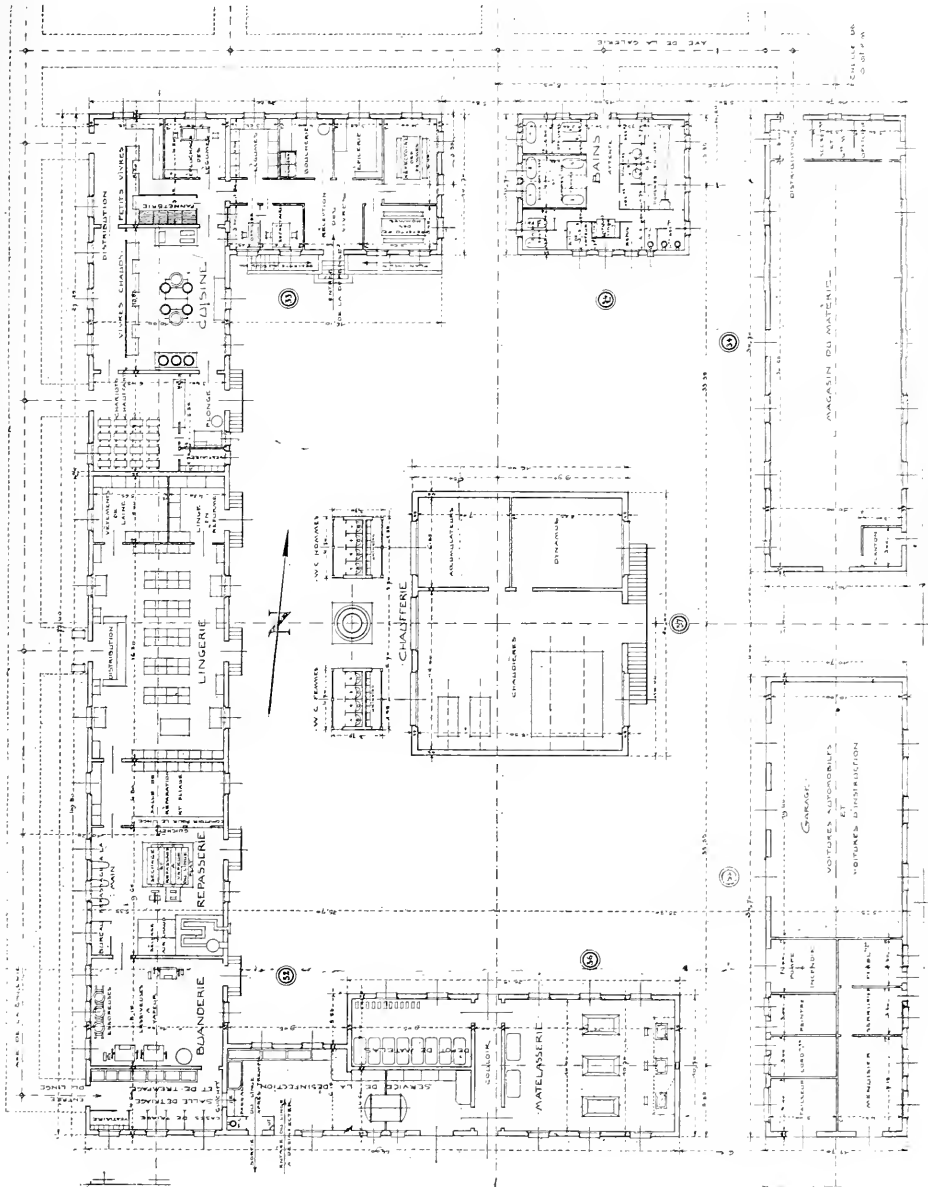
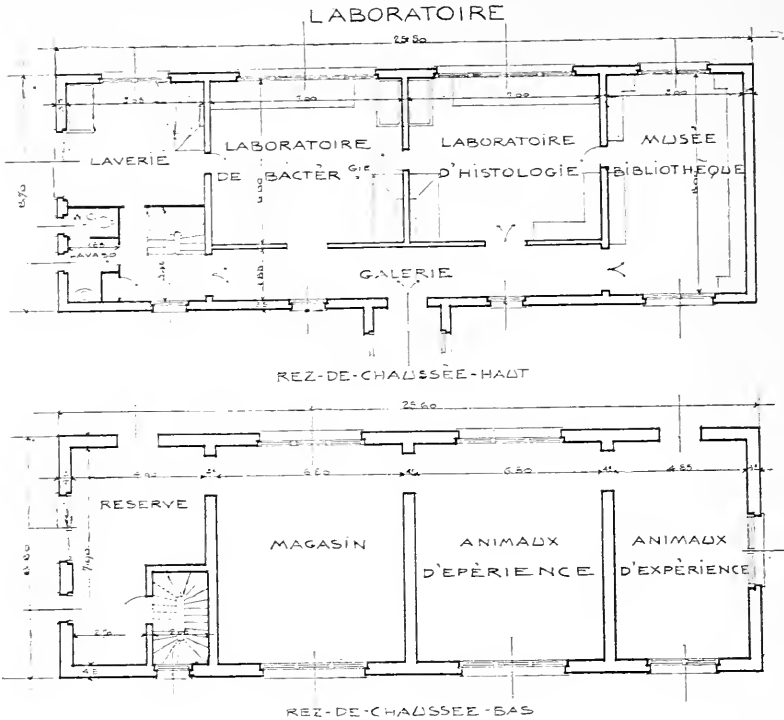


FIG. 422. HOSPITAL MILITAIRE, D'ISSY-LES-MOULINEUX. MECHANICAL GROUP.
Charles Butler, Architect.

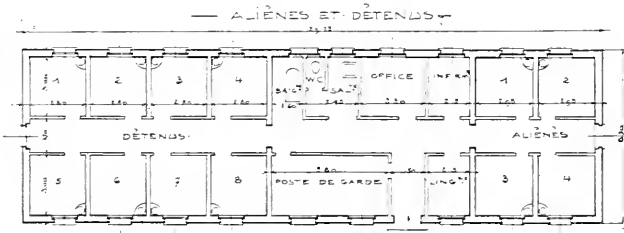
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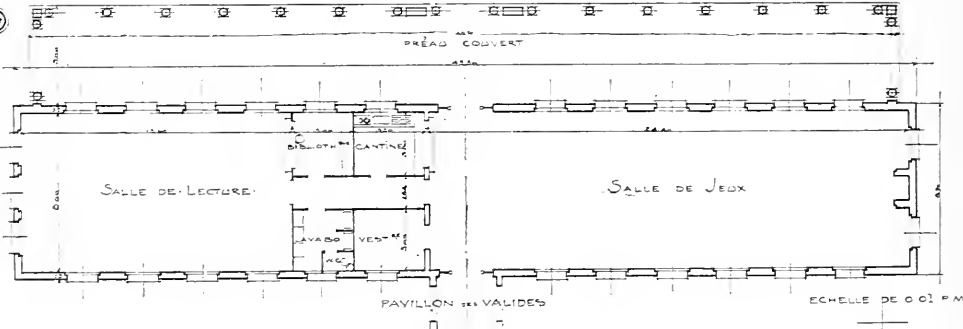
FIG. 423. MILITARY HOSPITAL AT ISSY-LES MOULINEAUX.

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FIG. 424. MILITARY HOSPITAL AT ISSY-LES-MOULINEAUX.

each ward is placed a terrace, arranged to be protected by awnings in summer. At the extreme north, forming a shield for the ward buildings, are the pharmacy, operating pavilion and laboratory building. Each of these buildings, owing to the slope of the ground, has a complete basement for storage purposes. The pharmacy and laboratory plans need no special comment. In the case of the operating pavilion, there should be noted the arrangement of the plaster room for fracture work in close proximity to the operating room, and scheme of plan by which nurses and orderlies coming to the pavilion for sterilized dressings for the ward dressing rooms, have access only to the room where dressings are prepared and not to the rest of the building. In the operating room and plaster room ar-

rangements are made for radiograph work to be done on the spot in case it is not convenient to transport patients to the X-ray room. The physiotherapy pavilion opposite the operating pavilion is of especial use for work (electrical, mechanical, etc.) for the re-education of wounded members.

“The general plan of the wards proper offers nothing especially new, except the acceptance by the French military authorities of the principle of small wards. In this case each ward contains eighteen beds with four additional isolation rooms. The linen room is placed between the ward and the isolation rooms, with glazed sash, allowing supervision both of the ward and the isolation rooms, while from the diet kitchen or office, the ward may also be seen.

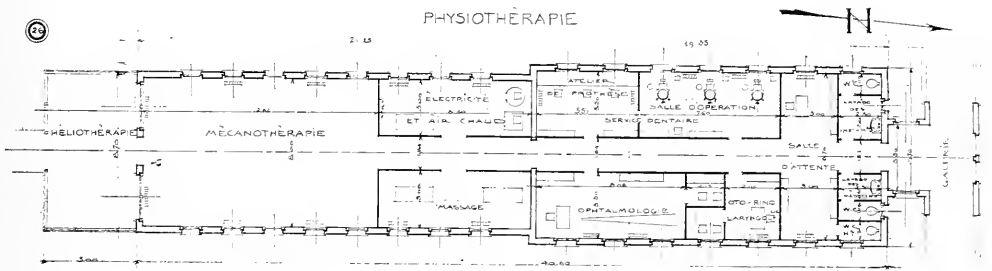


FIG. 425. MILITARY HOSPITAL AT ISSY-LES MOULINEAUX.

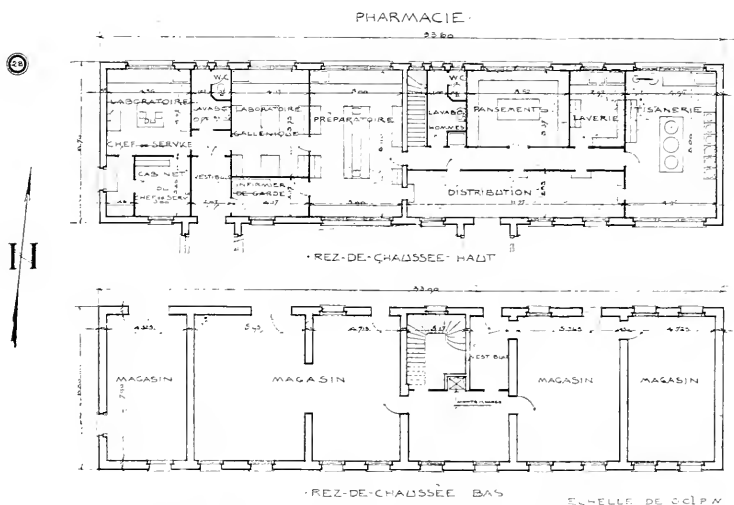
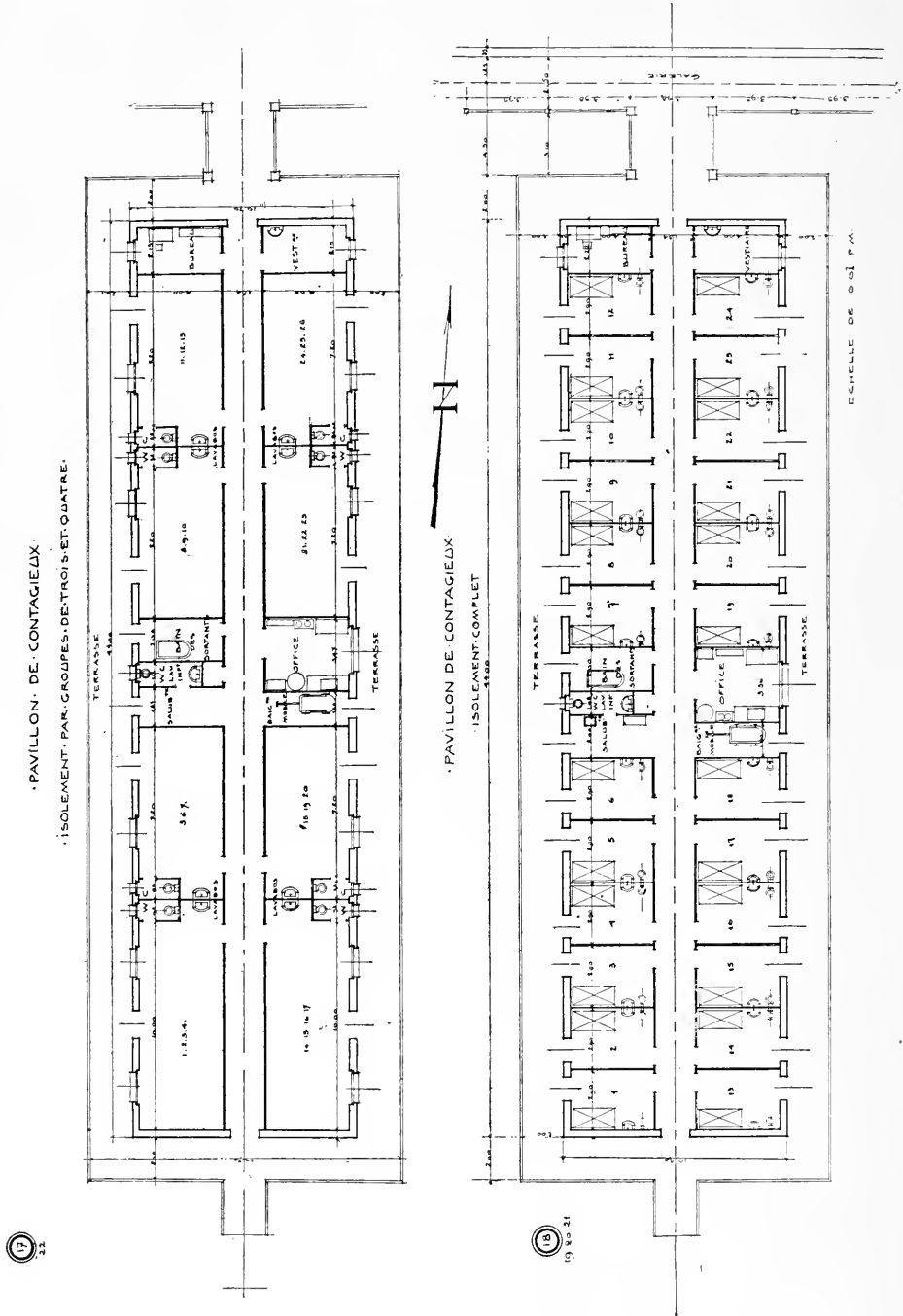


FIG. 425A. MILITARY HOSPITAL AT ISSY-LES-MOULINEAUX.

"The service rooms are those included in our typical American plans.

"The convalescent pavilion, placed in the garden, comprises a large game room

for billiards, shuffle-boards, cards, etc., with a small canteen adjoining, where the patients are allowed to purchase one, or at most two, drinks per day.



"At the other end of the building is a reading room with a small circulating library. On the garden side is a covered porch extending the entire length of the building.

"The contagious division is treated as a separate administrative unit with entrance on the south side of the property and a service building containing a small operating room and record office, etc.

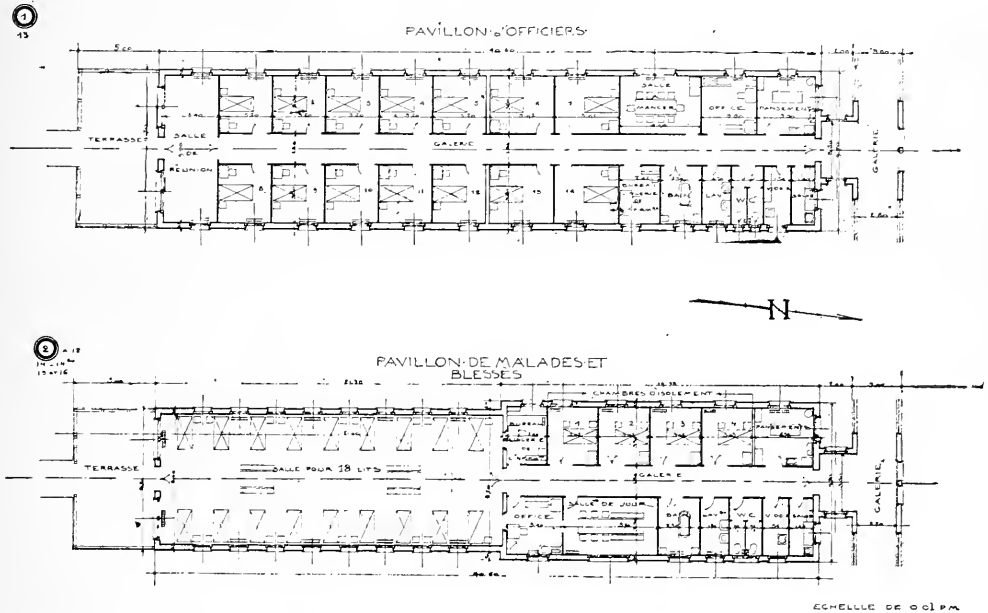


FIG. 427. MILITARY HOSPITAL AT ISSY-LES-MOULINEAUX.

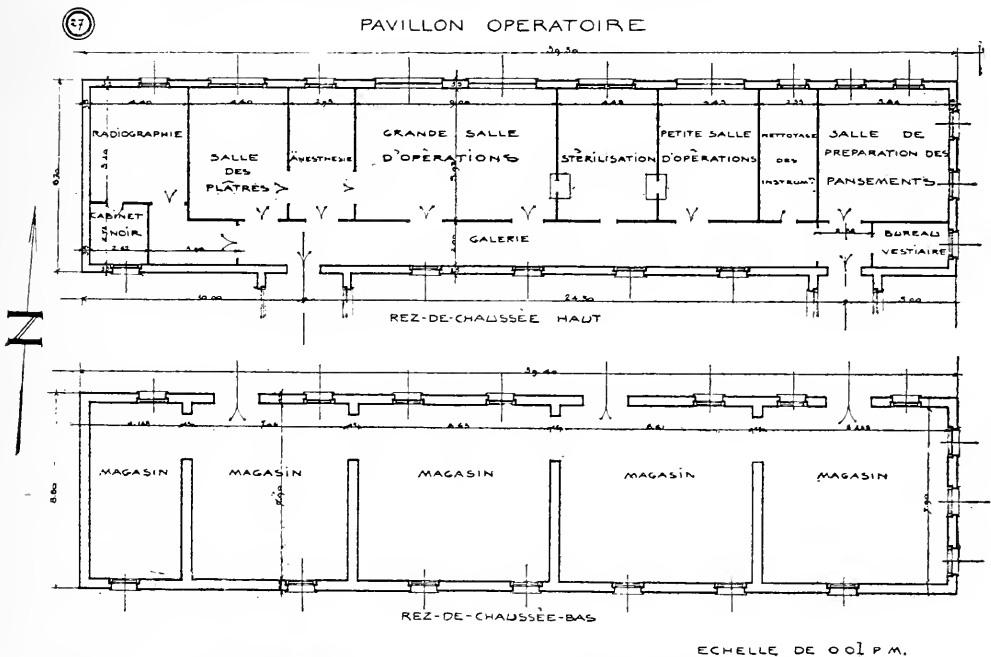


FIG. 428. MILITARY HOSPITAL AT ISSY-LES-MOULINEAUX.

"The contagious pavilions themselves are of two types, four being arranged according to the system of the Pasteur Hospital, in Paris, for complete isolation, and two for isolation in groups of three or four. The patients are brought into their rooms through the glazed doors leading to the terrace which surrounds each of these pavilions, and while under treatment there is no necessity for the patient leaving his room, the movable bath being brought in when necessary, while nothing need be taken out of the room, as each room contains a toilet fixture and a wash basin. Each pavilion contains a discharge room with bath, for patients leaving the institution. The pavilions for isolation by groups would be used in case of epidemics where enough cases of the same disease were present to justify it, and where the nature of the disease permitted grouping.

"To the extreme west lie the small pavilions for patients who may become insane and for patients under arrest, each patient being placed in a separate room.

"The morgue and chapel (mortuary) is also in this corner of the lot.

"To the right and left of the principal entrance are the groups of buildings, for nurses on the right and for orderlies on the left; these, with the small houses for the head doctor and the superintendent, being the only two-story buildings. The nurses have all single rooms, while the orderlies, being soldiers, are grouped in dormitories.

"Owing to the necessity of complying with military regulations, a separate kitchen is provided for the orderlies. The nurses, however, are fed from the hospital kitchen.

"In the southeast corner of the property lies the service group with its own entrance, directly opposite, which is the power plant. The kitchen and laundry, both run by steam, lie adjacent to the corridor, which gives access to the wards, so that food can be transported in wheeled cars to the main group and to the contagious group.

"East of the kitchen lies the bath establishment for douches, sulphur baths, etc.

"Along the east front of the property are the storage buildings and along the south side of the service court is the mattress repair building.

"It is to be noted that every part of the plant is reached by covered corridors, and as there are no steps, all transport of food, patients, etc., is on wheels.

"The corridors leading to the contagious pavilions are closed on the north side only."

Another small base hospital of less permanent nature, which was also designed by Mr. Butler, on the unit system of construction, and erected nearer the front, "Somewhere in France," is here shown. (Fig. 429.)

The plans for the United States Overseas Hospitals were just finished as this book was going to press; and at the expense of a few weeks' delay in giving the book to the public, they are here shown and described. The planning of these buildings was placed in the hands of Mr. Butler and the writer by the Engineer Depot of the United States Army, of which Colonel W. H. Rose is the head. Not only the plans, but all the details of construction, equipment and fixtures have been designed.

These units consist of eighty-seven buildings each, and comprise all the essential departments of an up-to-date hospital, all of "demountable" portable construction. The type of construction used is similar to that employed by Mr. Butler for the Rockefeller Demonstration Hospital in New York.

The block plan (Fig. 430) shows the ideal grouping of buildings; but the actual layout on the ground must depend on the available site, on the contour of the land, on the local surroundings, etc. The orientation of certain buildings must always be considered in every hospital group; thus, to obtain the ideal lighting of the ward buildings, the wards should run north-south, and the ideal condition for operating buildings is to have the operating rooms face the north, and the aim should always be to approximate this.

In the war hospital, especially in one near the front, greater facilities must be made for the reception of the patients;

thus, the Receiving Building (Fig. 431) will accommodate a large number of stretchers at one time, and will allow for proper segregation and classification of the patients, the taking of the histories, etc. The Bathing Room adjoining is provided with high slab tubs. In this room the patient's clothes and effects are removed, which, after washing and fumigating, are deposited in the adjoining Patients' Effects Building, No. 3 on general plan.

As all buildings are connected by enclosed corridors, the patient can be taken, by stretcher or otherwise, to the operating building or to the ward, according to his condition.

The Operating Buildings (Fig. 432), two in number, for the general operating service, consist of thoroughly equipped suites of rooms with every convenience of a modern operating unit in a surgical hospital. The rectangular shaped building, made necessary by the type of construction adopted, does not interfere with the efficiency of the plan except, perhaps, that there is a superabundance of corridor. The operating rooms are provided with abundant light, by means of both windows and skylights. Between the two main operating rooms is the sterilizing room, and sterile water is brought to the scrub-up sinks in each operating room. The scrub-up sinks, while they are simple enameled sinks, are provided with the most approved elbow-action scrub-up devices. Steam sterilizers and blanket warmers, a complete X-ray suite, a plaster room and general utility are all provided.

For the units placed near the front, the two buildings, Nos. 4 and 5, would be needed, providing for ten operating tables.

The walls of the operating rooms are rendered smooth by an additional surface of enameled canvas, while the floors are cement.

A separate operating and treatment building is provided for the ear, nose and throat (Fig. 433); another for the eye (Fig. 434); and another for the dental and laboratory work (Fig. 435).

The Ward Building (Fig. 436), of which there are thirty-two in each unit,

is much the same as that adopted by the French and English army. It consists of the ward of thirty-two beds and of a twenty-foot airing balcony at the south end. The ward itself is 22 feet wide, 102 feet long, and has twenty-four windows. These windows, occupying about thirty per cent. of the wall surface and opening from the top, afford the maximum of light and air.

In each ward there are six emergency exits. The side wall panels, hinged at bottom and opening out, form a ramp, down which the beds can be run in case of fire or other cause for quick exit. The walls, doors and roofs being double, these ward buildings are comfortable in both winter and summer.

The utilities consist of a linen room, a nurses' office, a toilet room, a surgical dressing room, a small serving kitchen, a small office for the military attendant, and an isolation room for a delirious or moribund patient.

In each group there are three Isolation Buildings (Fig. 437) for the care of communicable or contagious diseases. These provide for twenty-six patients each, and are planned on the so-called "Pasteur" or single room system. The ten single or isolation rooms are entered from the outside. Each room is self-contained, having a water closet and a sink with special elbow faucets, so that it will not be necessary for a patient to leave the room until he is convalescent. The service of food and attendance to the patient are from the inside corridor. Provision is made for linen, serving kitchen, utility room and discharge bath. The discharge bath is approached from the outside as well as from the inside. For convenience in bathing, a portable "slab" bath, which can be wheeled into any room, is provided with water served from the sink and drained into the water closet bowl. The attendant can readily give the bath, clean the slab, and it will then be ready for the next patient.

There are two convalescent wards in each building.

For the care of the psychopathic and neurologic patient, two buildings, called the Neuro-Psychiatric Wards (Figs. 438 and 439), are provided. The more violent

cases are confined in the portion set apart for them, consisting of isolation rooms, a day room, and a room with continuous-flow baths. This portion of the building is protected by wire guards to prevent the escape of patients. The milder cases of insanity are cared for in a different section of the building.

The building for the strictly neurological cases provides special bath and medical treatment rooms, as well as wards, day room and rest rooms.

For sick officers, two Officers' Ward Buildings are provided (Fig. 440)—one with wards and semi-private room, and one with private rooms and mess.

For the convalescent patients, about fifty per cent. of whom are ambulatory or walking patients, dining rooms or mess halls are planned; also, a central bath house. For recreation, the assembly hall or post exchange is provided.

So much for the buildings for the patients.

The administration and mechanical buildings occupy a most important part in each group.

In the Administration Building (Fig. 441) are, of course, the offices for administration, and they are much the same as in a civilian hospital. Headquarters for the commanding officer, secretaries, matron and pharmacist are provided, as well as postal and telegraph offices.

The commanding officer and chief surgeon are given a small house; the other officers are in a separate building. The female nurses have separate buildings, with single rooms for each nurse. Hospital Barracks house the enlisted men.

The Kitchen Building (Fig. 442) is worked out with great care, and contains the bakery, the bread room, the main kitchen and the scullery; also a complete ice plant for cooling refrigerators in this building and for the making of ice for the hospital. High pressure steam is used largely for cooking, and this is obtained from a nearby boiler plant.

The dish washing is accomplished in a small building (Fig. 443), situated between the kitchen and mess halls; this building serving as well for the housing of the food carts.

The process of serving food is simple;

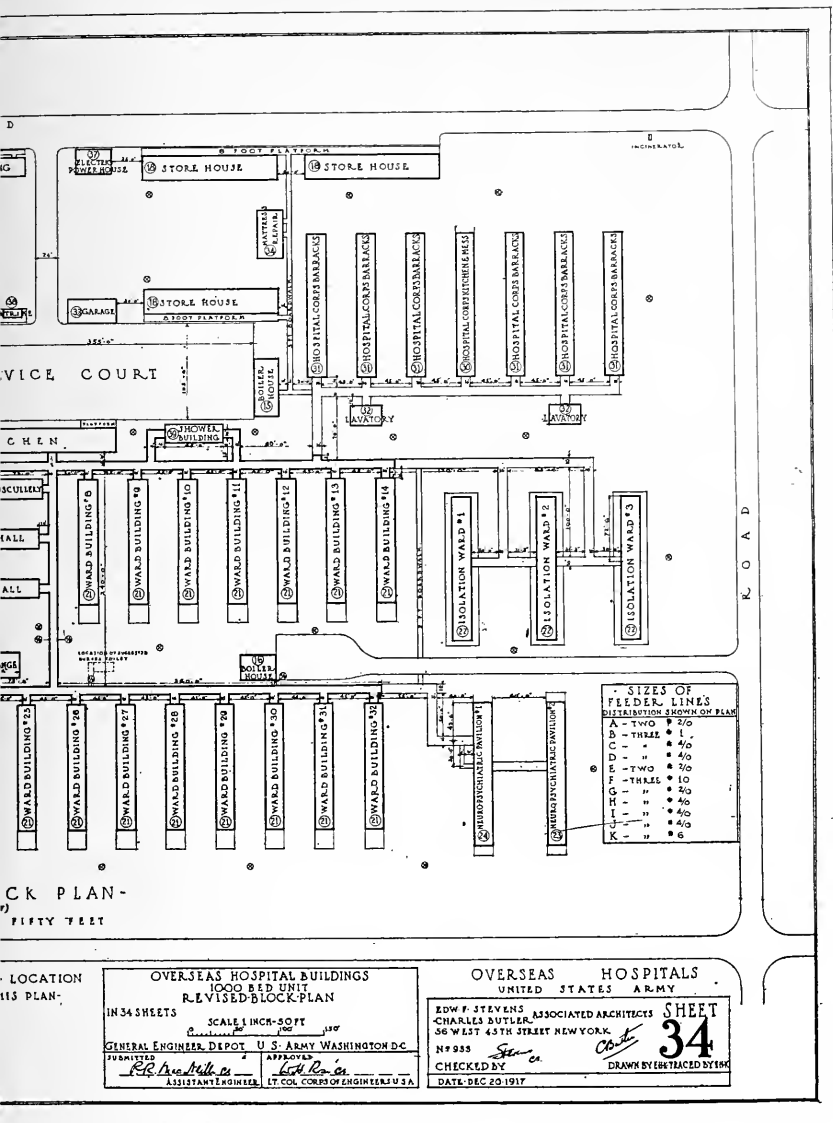
the orderly starting with his food cart first obtains his quota of hot dishes; then goes through the closed corridors to the kitchen, where he first picks up the bread required; next to the hot table to get the hot food, then for the dessert, and then through a closed corridor to the ward, where the food cart is used as a serving table, and the patient is reasonably sure of getting hot food.

The Laundry Building (Fig. 444) has been planned in reference to efficient work. The soiled clothes are entirely at one end, where, with modern machinery, they are sterilized, washed, dried, ironed, and folded, and then taken to a general storage room for distribution.

The construction of these buildings is simple—all of one story, built up of standard five-foot units. Notwithstanding that they will be of portable construction, with double walls, floors, and roofs, built in shops, transported to the war section and erected, they will be hygienic, easily cleaned, comfortable in winter and summer, and painted both inside and outside. The elevations and sections (Figs. 445 and 446) show the general type. Connections to these buildings are through enclosed corridors. The general appearance of the interior will be like the Rockefeller, a view of which is here shown (Fig. 447). The reproduction of a few detail drawings will show the construction adopted and the simple standard is used for plumbing fixtures.

The construction of the trusses is worthy of special study. The utilizing of available material, like the gusset plates at the junction of wall and roof and the section of channel iron in place of the usual turn buckle; the simplicity of erection; and the general pleasing appearance in the wards will be noted. The standard valve, which will be used on all sinks, bowls, and slop hoppers, is adapted for the surgeons' scrub-up with elbow valves and spray head, for bathing slabs with hose extension, and for general sinks throughout.

The heating system is so laid out, with several small heating plants, that no large pipes will be required; in fact, a 3-inch pipe is the largest used outside the boiler houses.



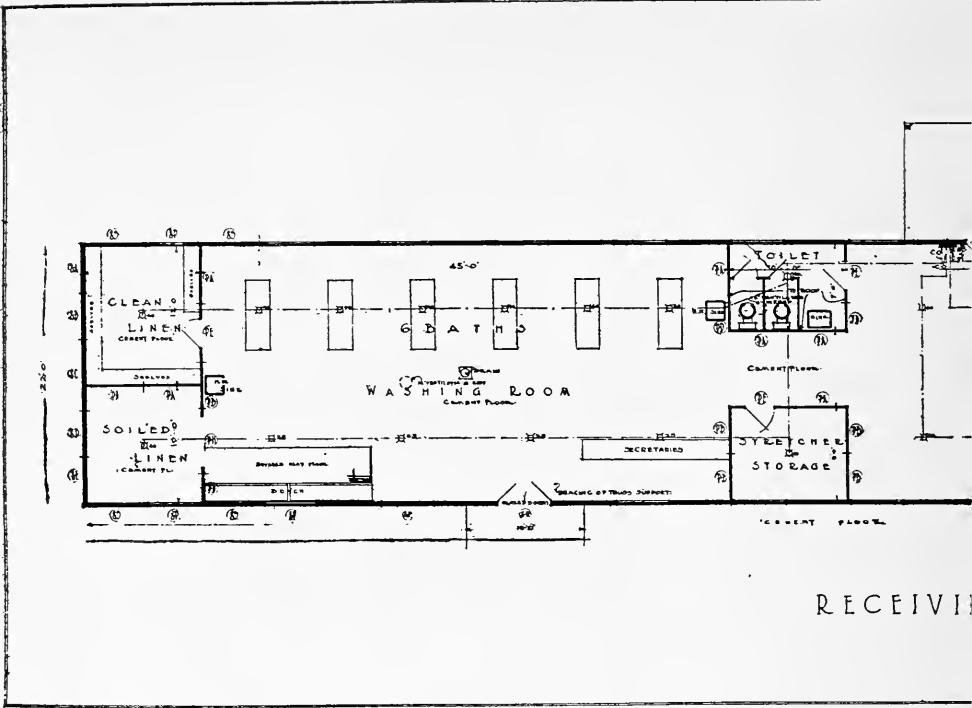


FIG. 431.

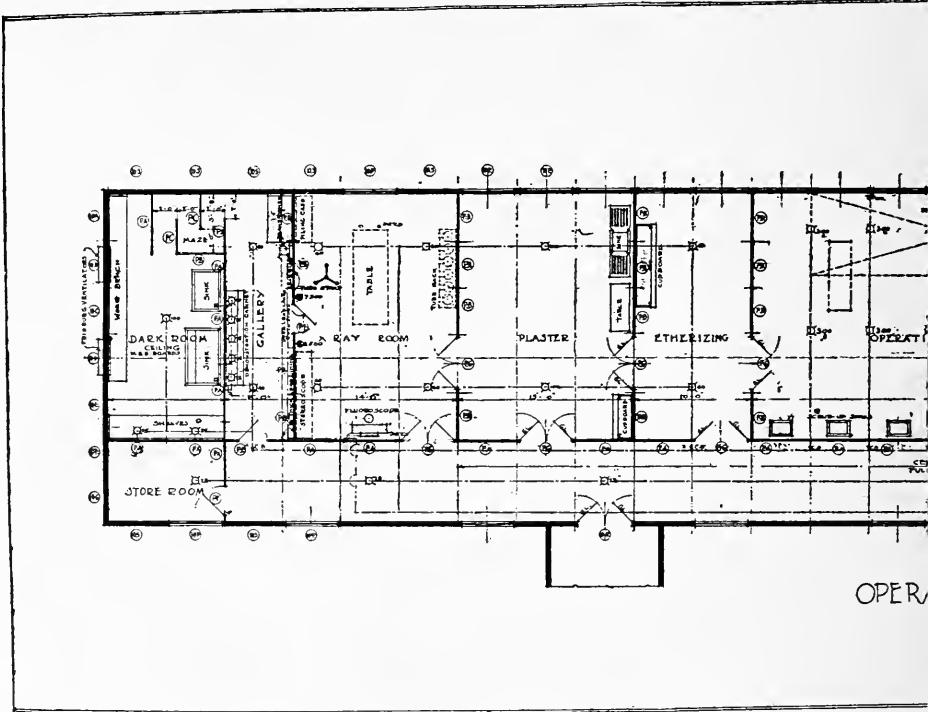
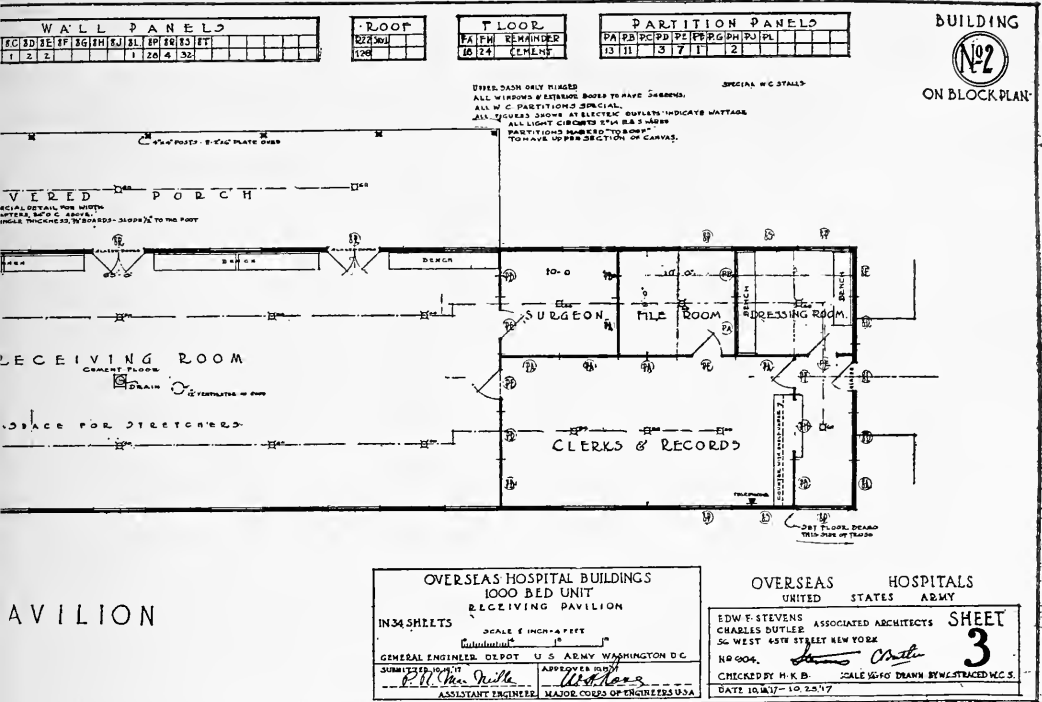


FIG. 432.



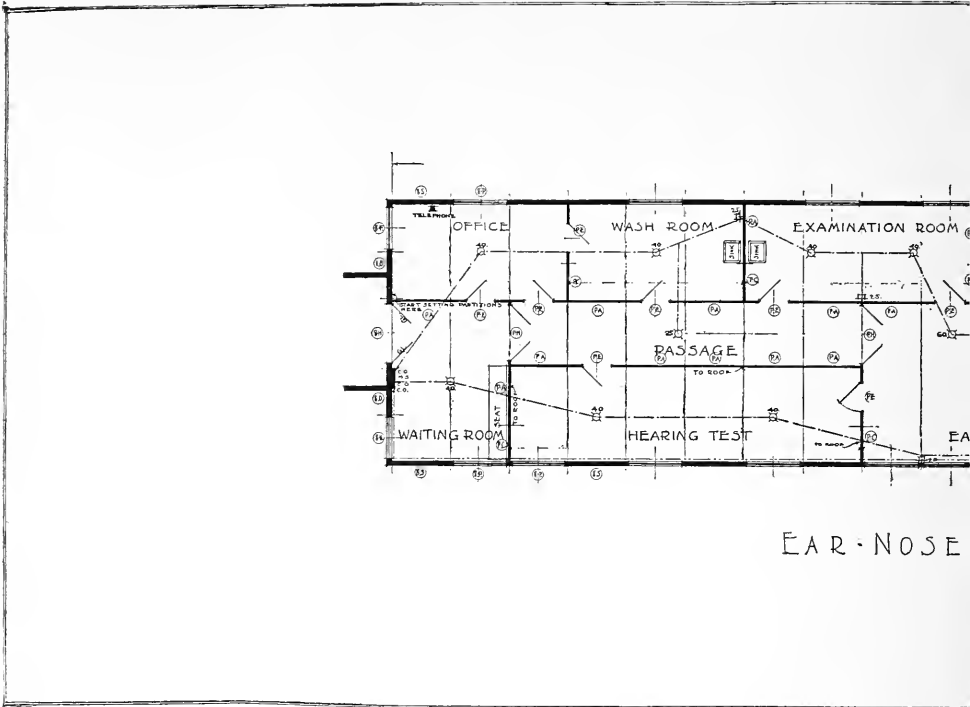


FIG. 433.

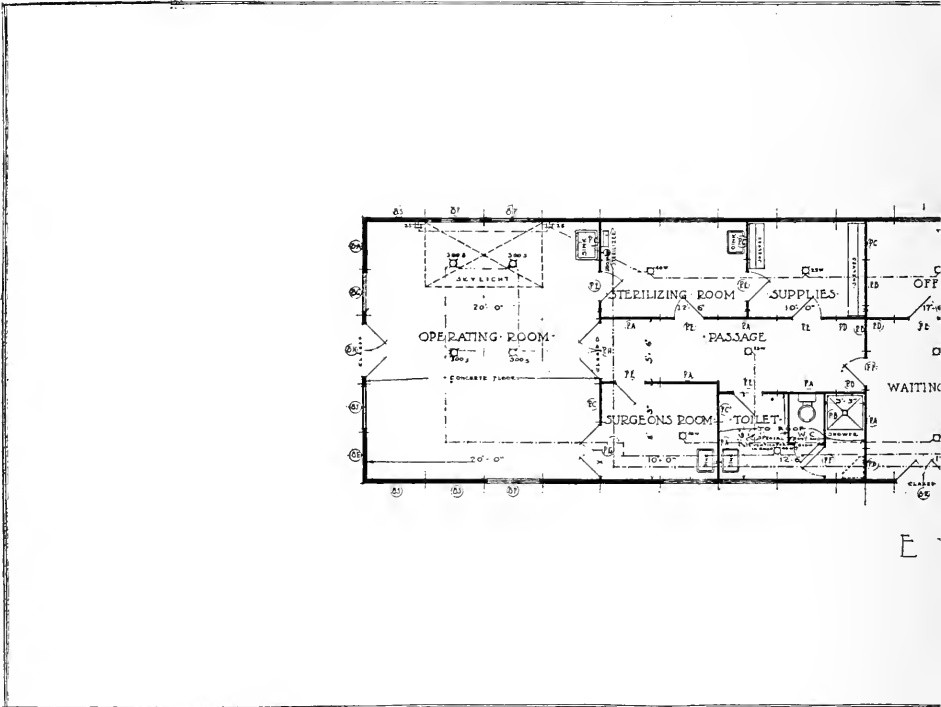
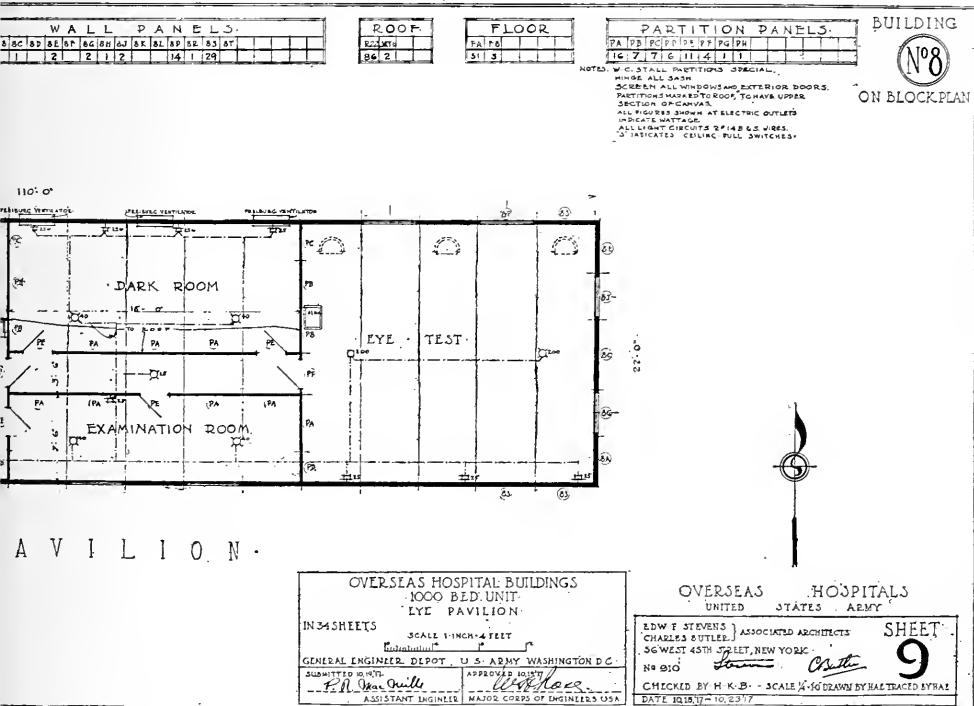


FIG. 434.



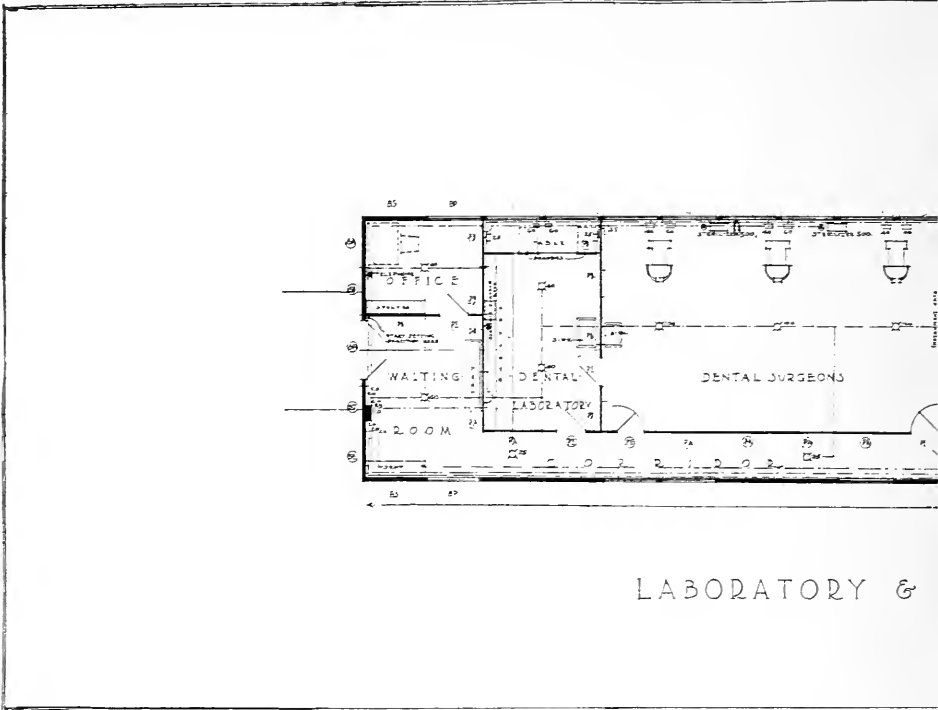


FIG. 435.

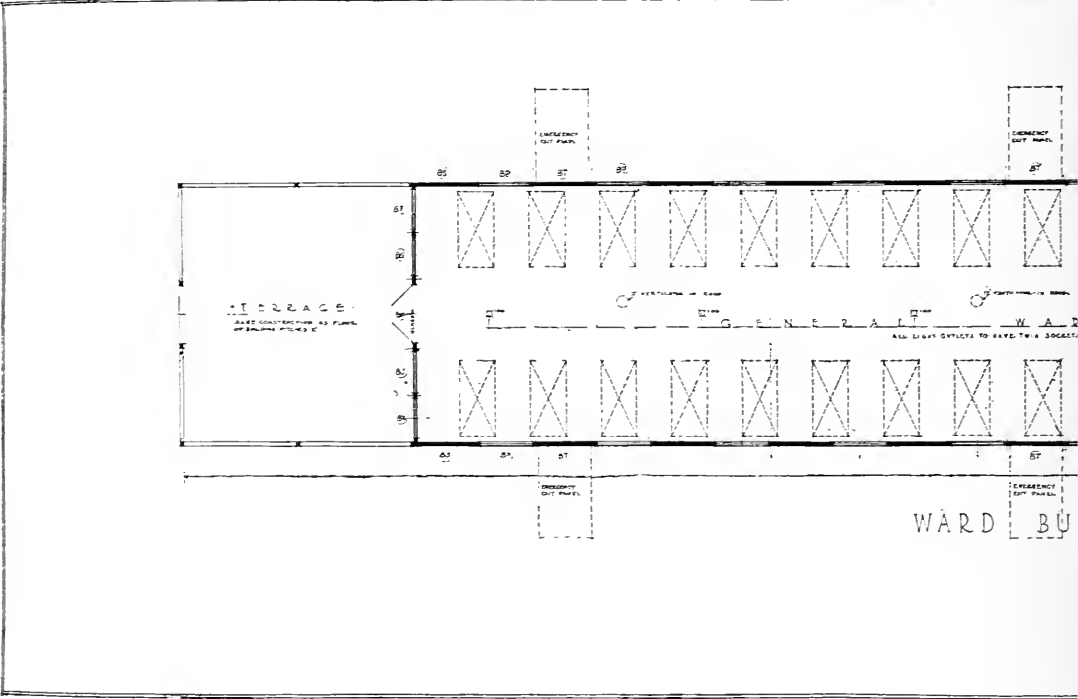
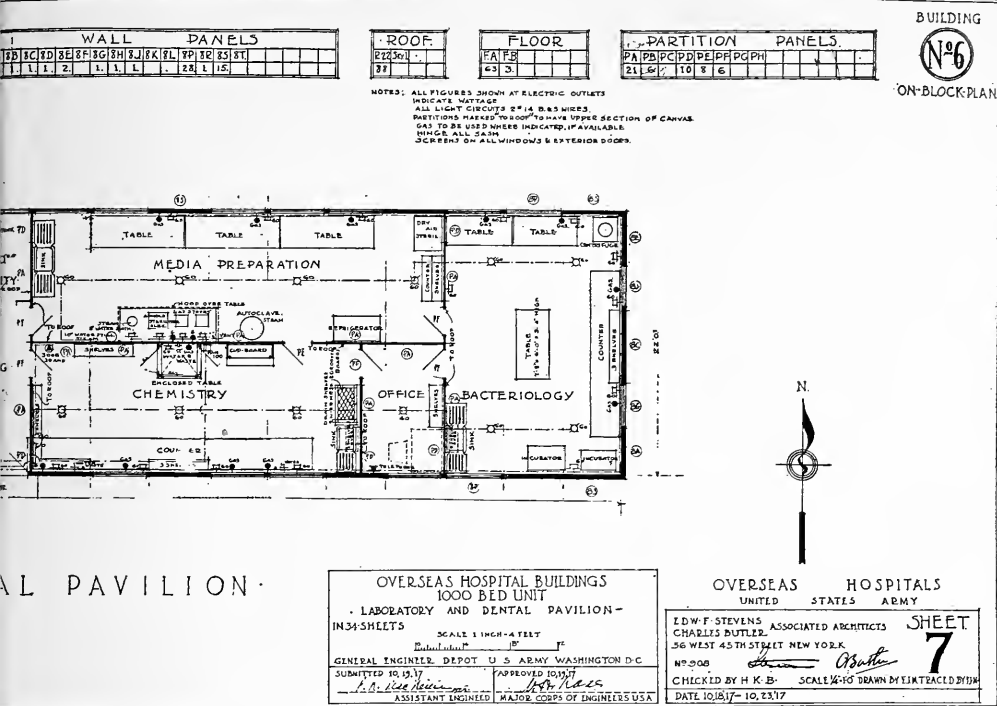
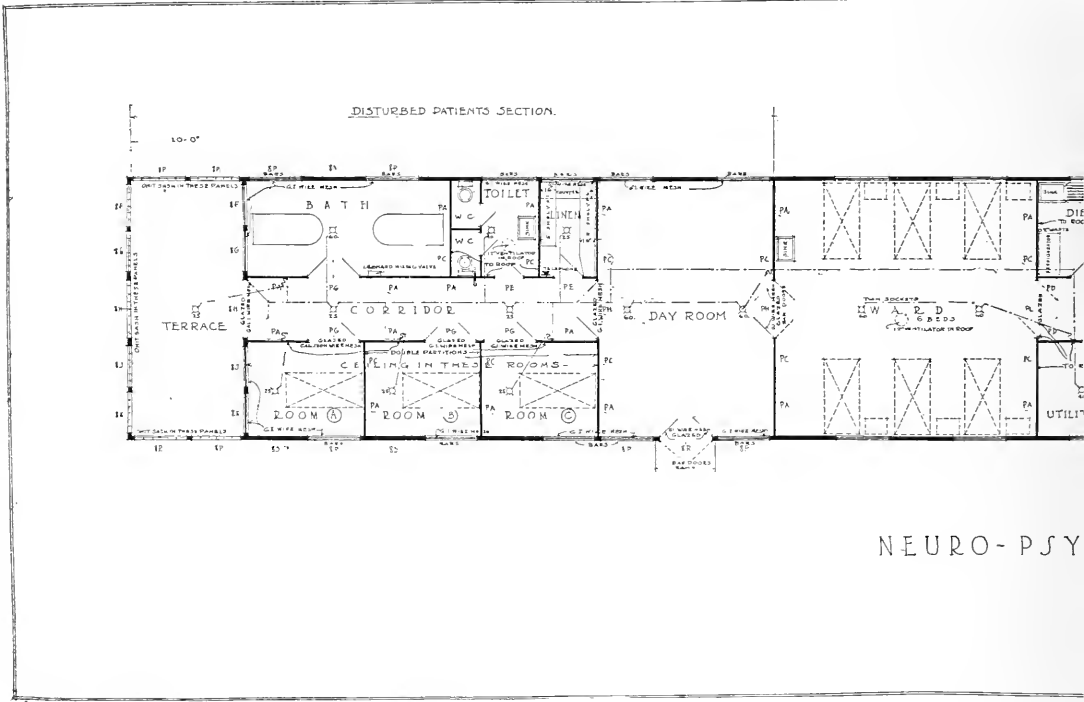
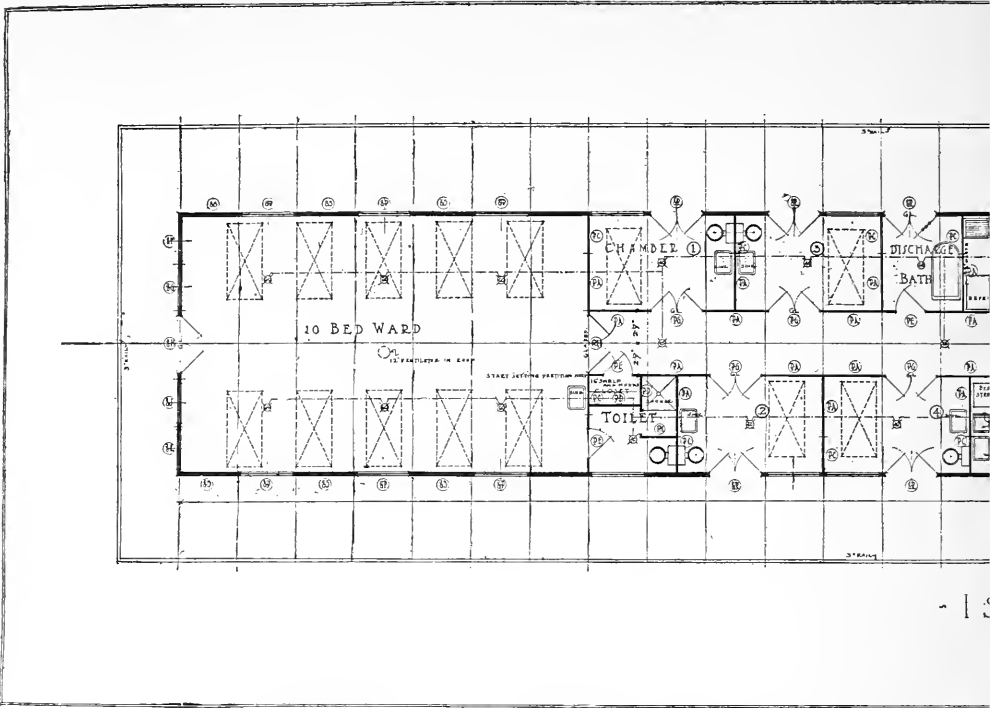
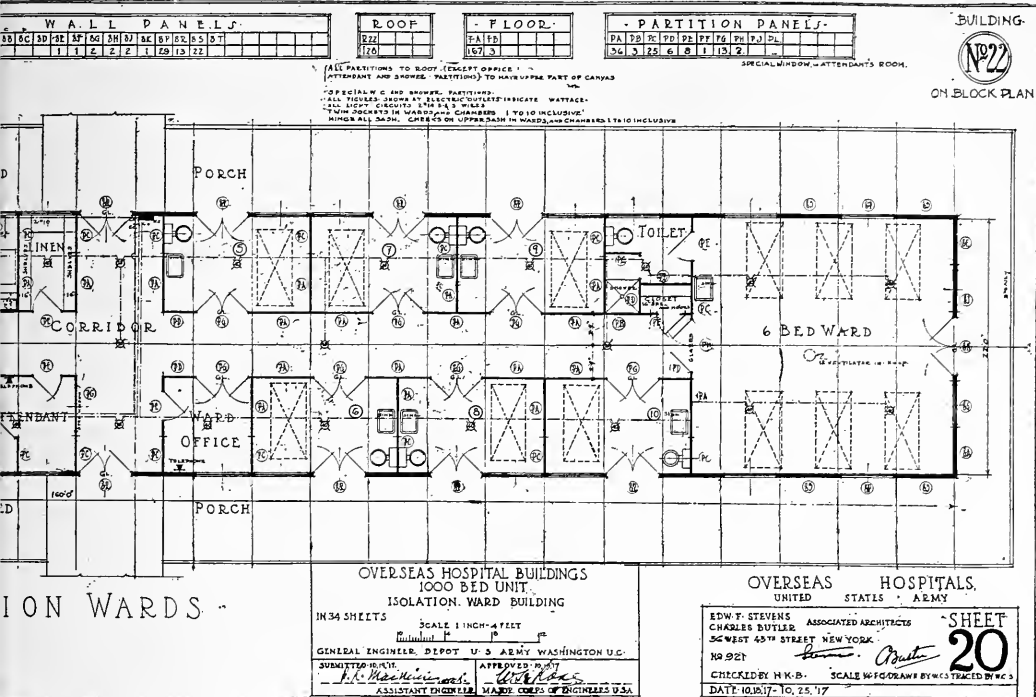


FIG. 436.







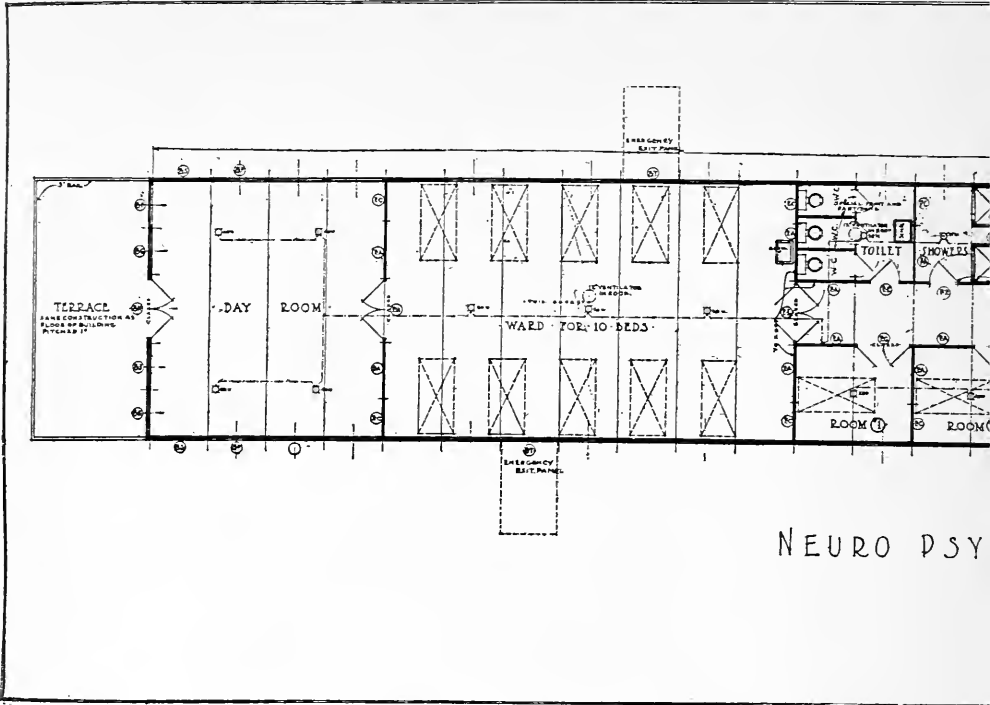


FIG. 439.

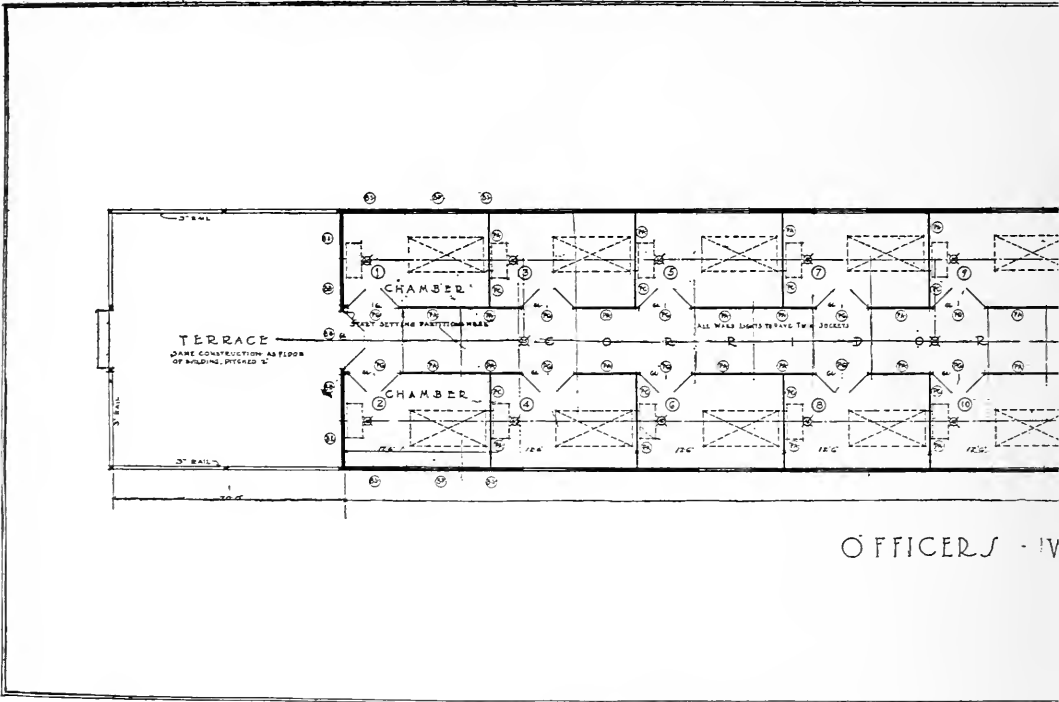
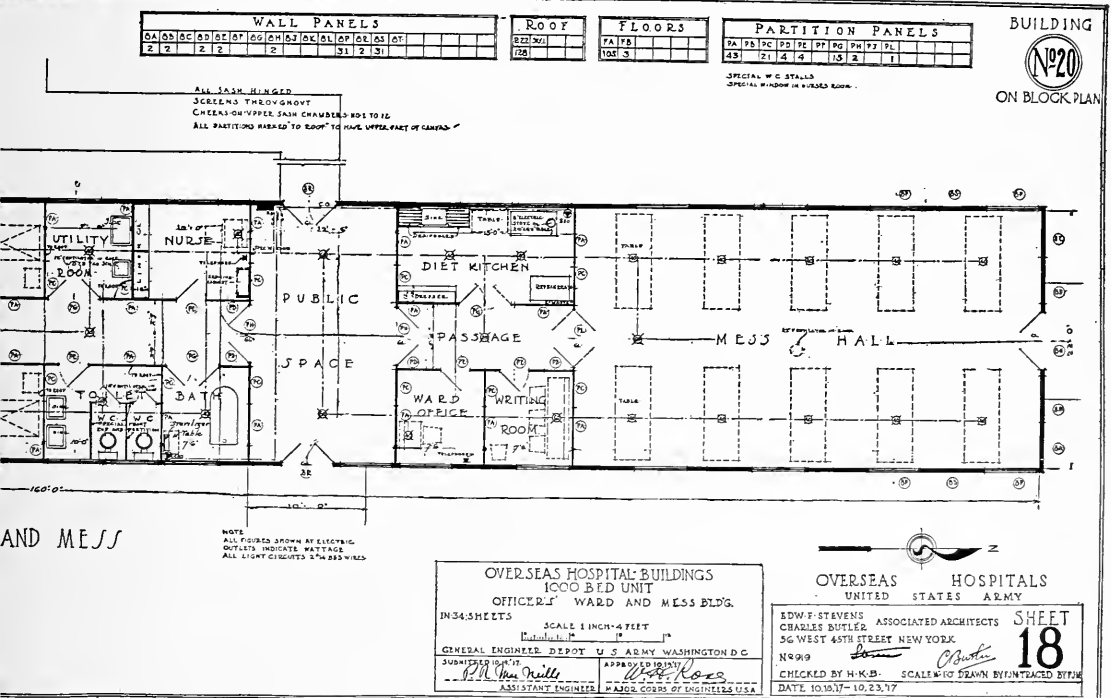
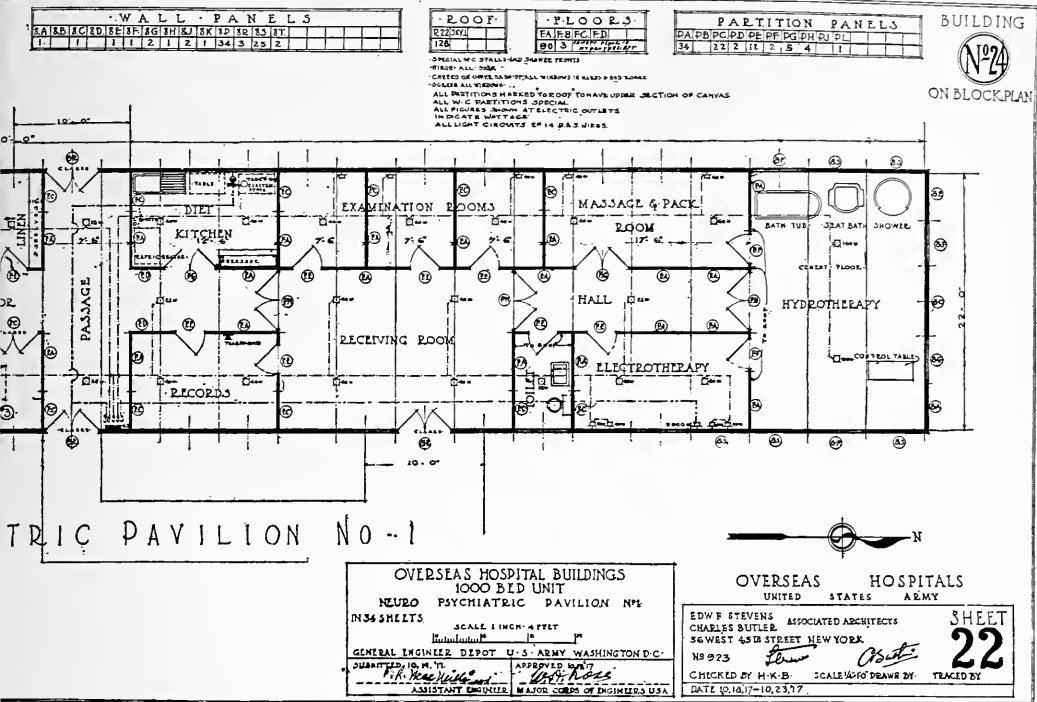


FIG. 440.



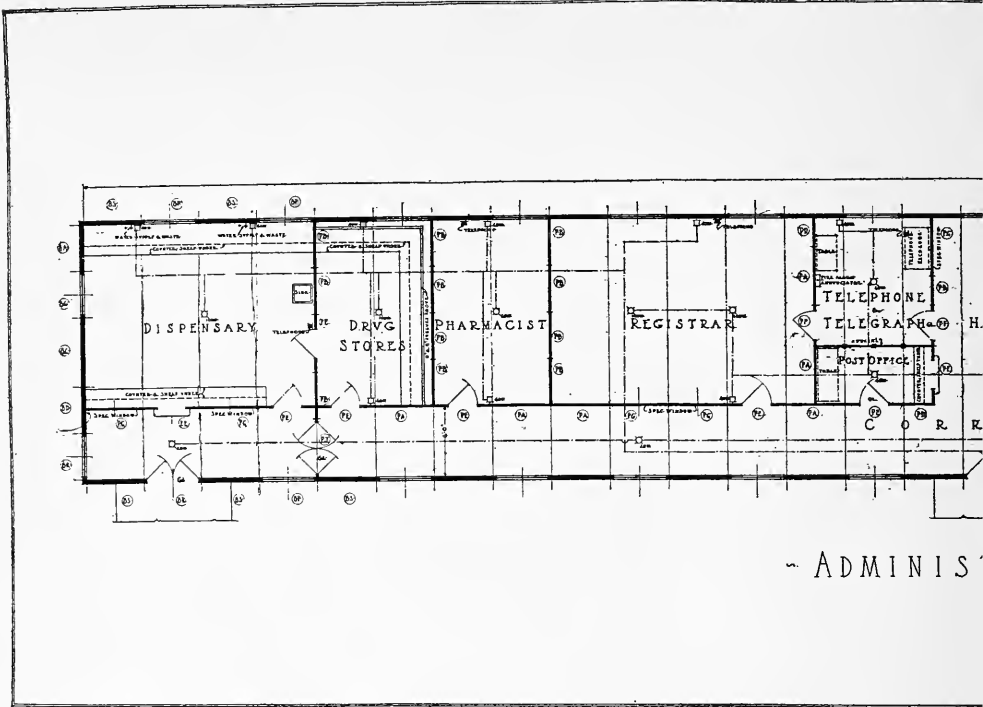


FIG. 441.

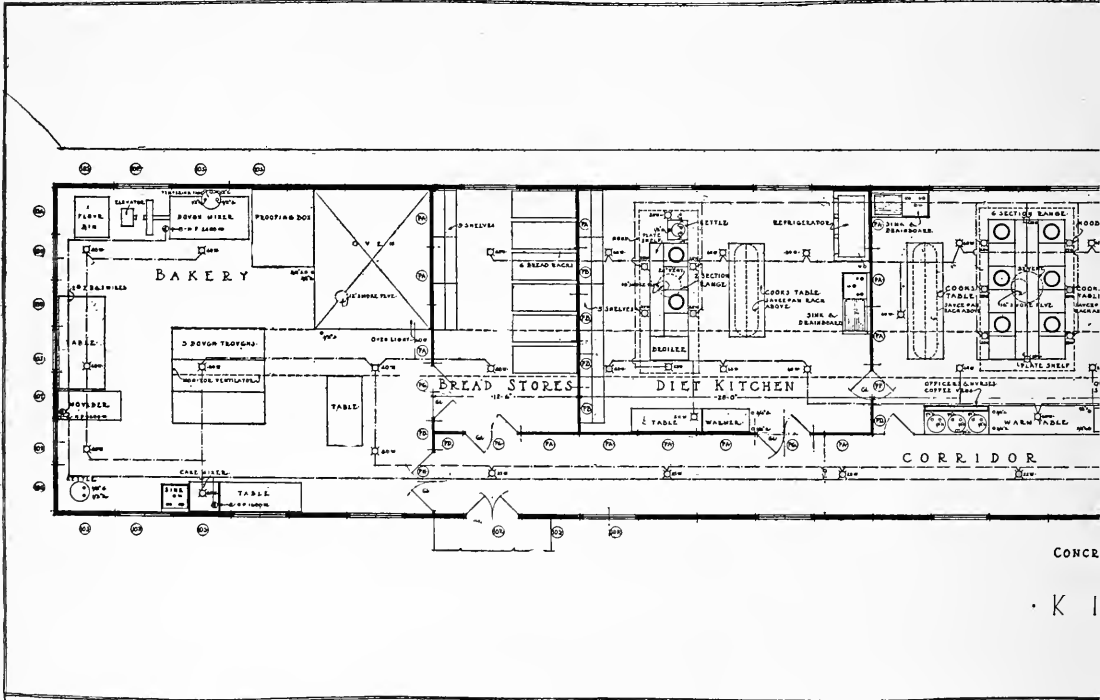
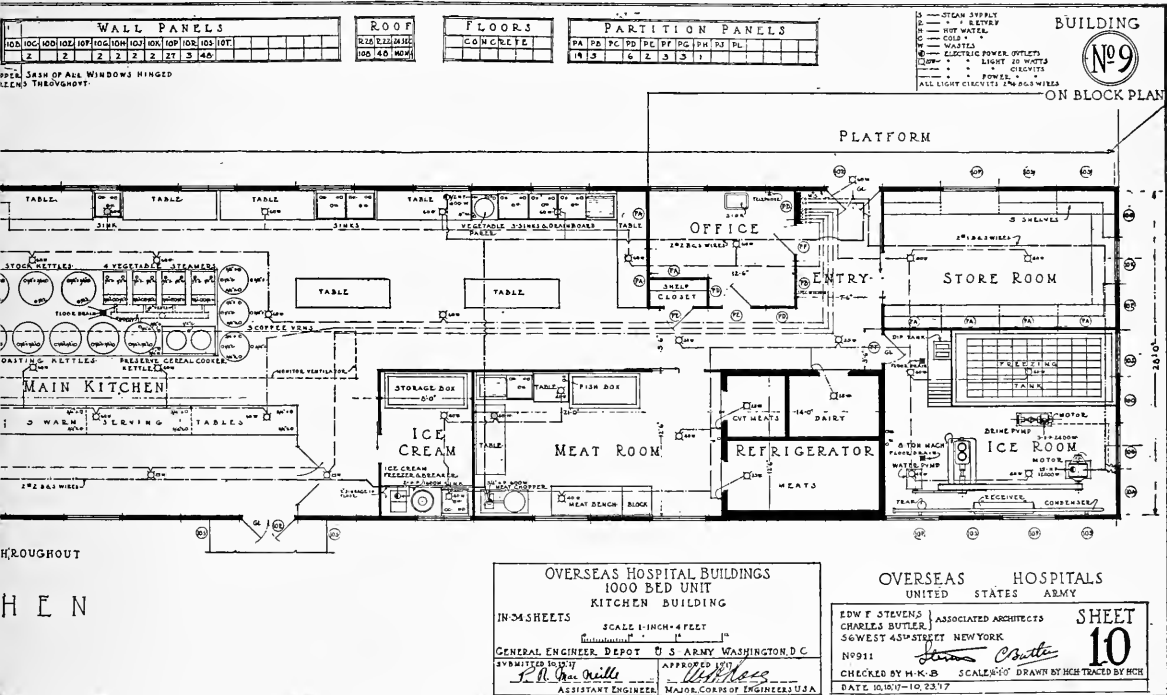
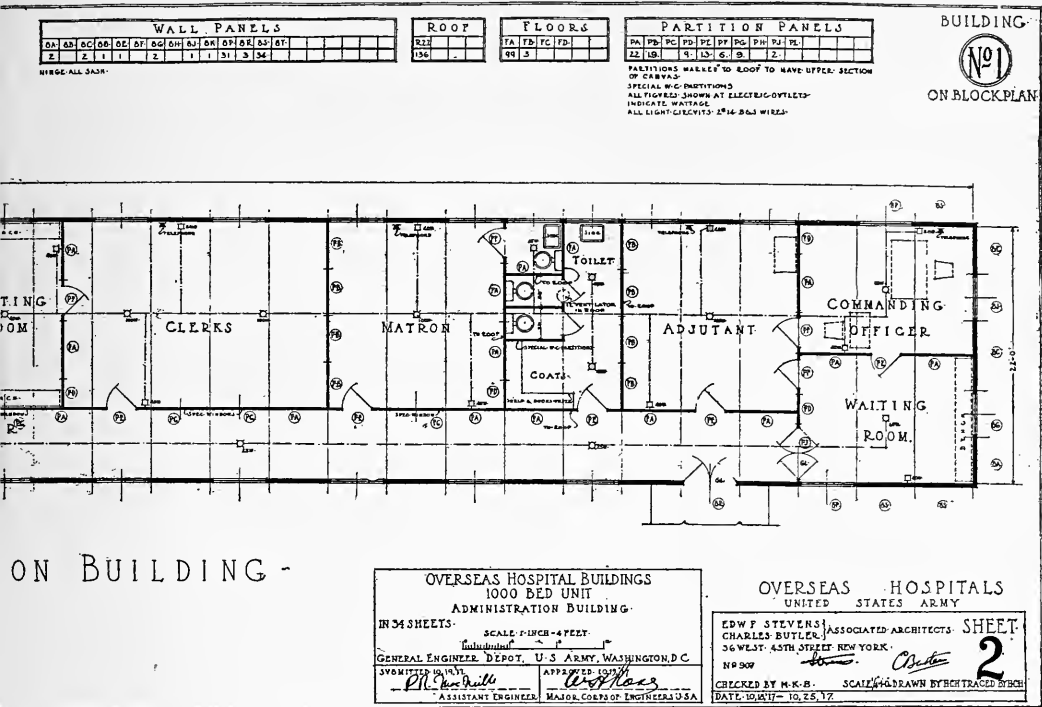


FIG. 442.



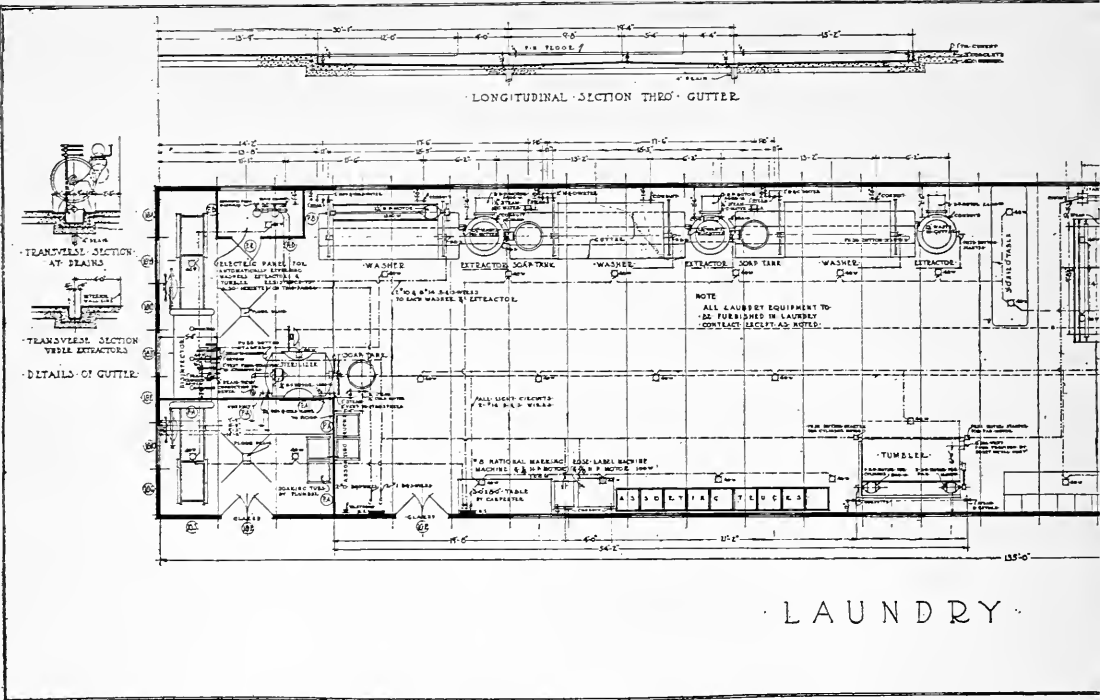


FIG. 444.

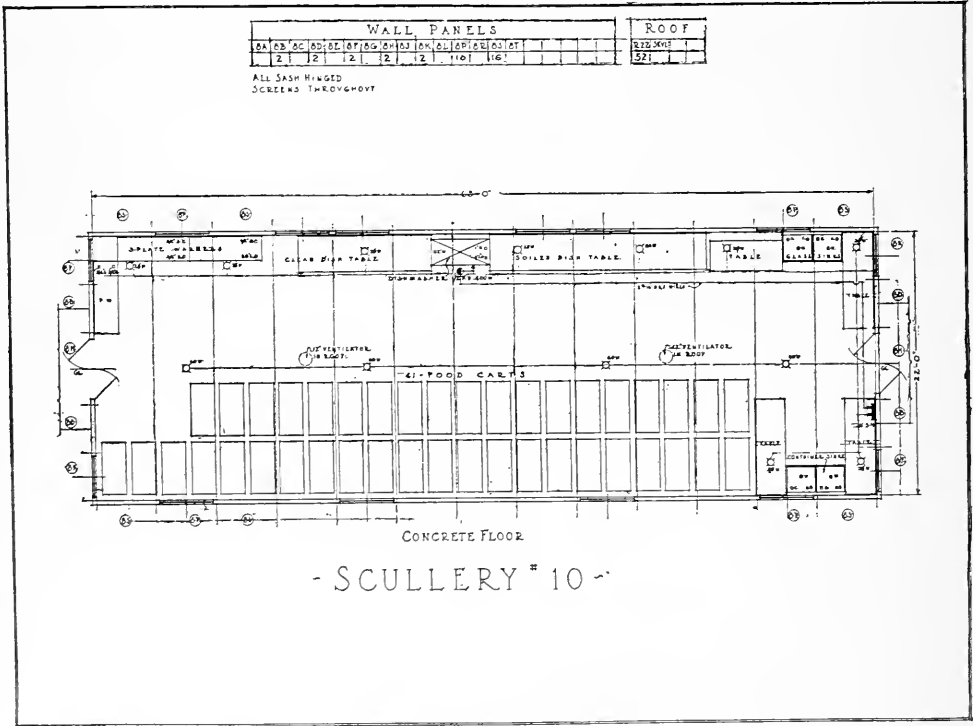
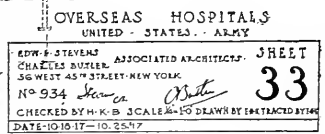
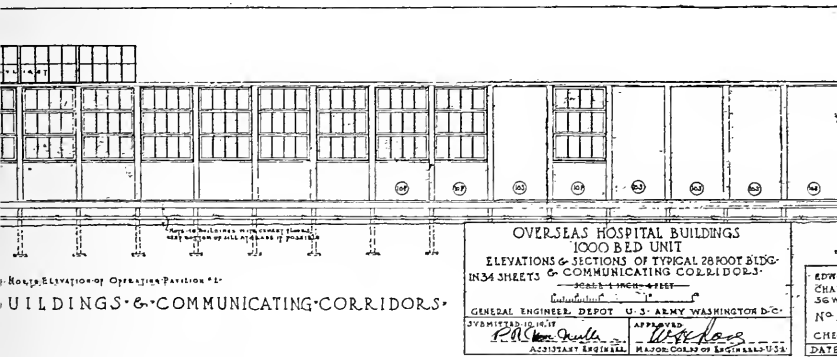
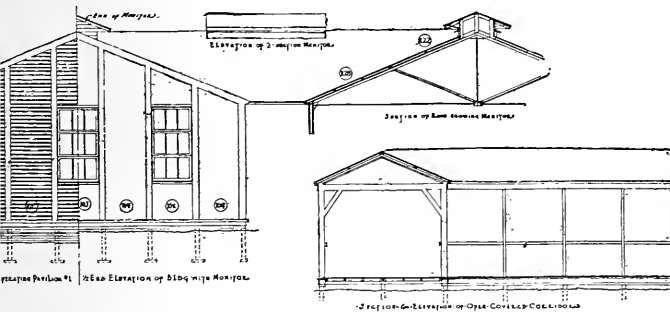
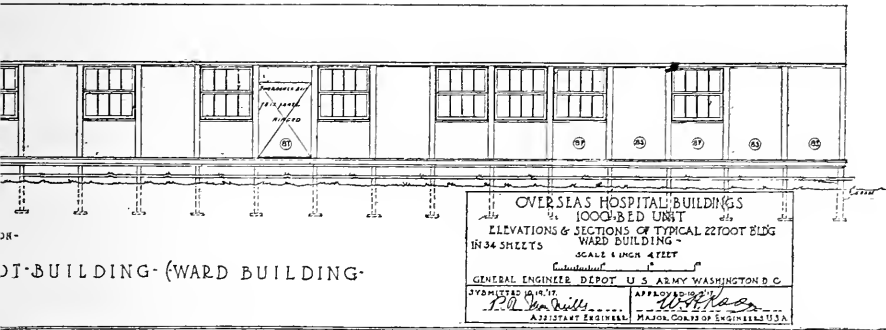
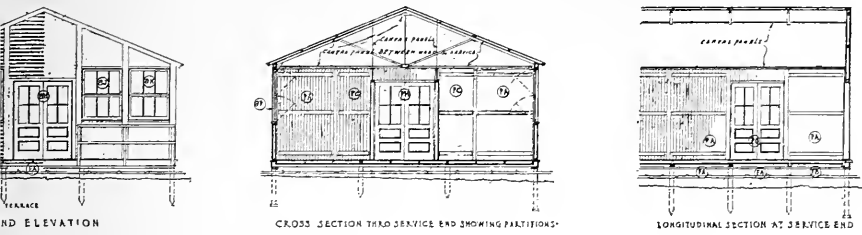


FIG. 443.



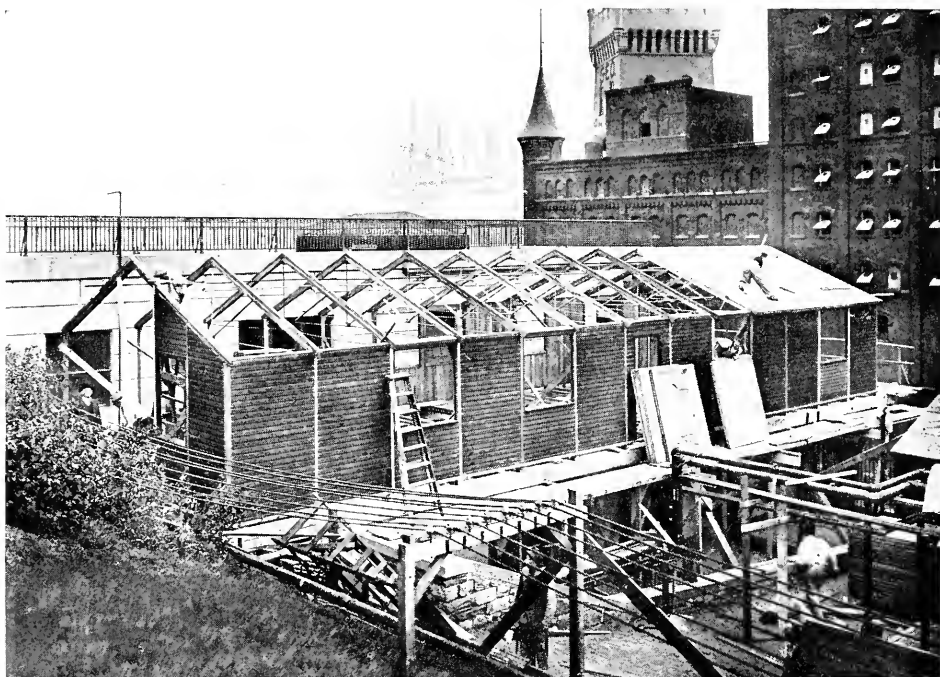


FIG. 447. ROCKEFELLER INSTITUTE BASE HOSPITAL WARD.
Butler & Rodman, Architects.

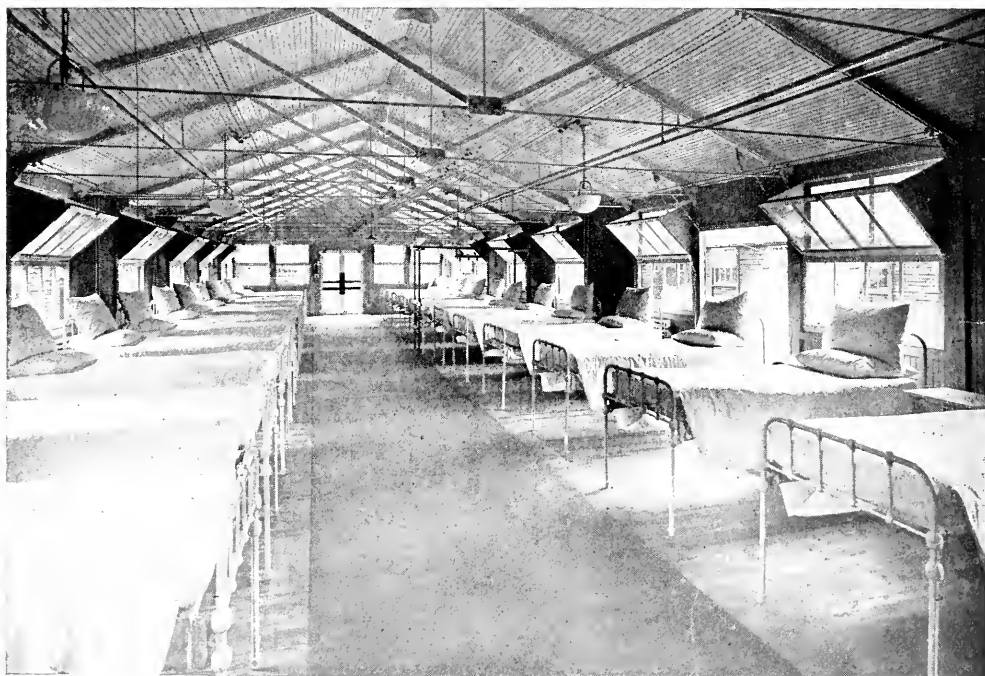


FIG. 448. EXTERIOR VIEW. ROCKEFELLER INSTITUTE BASE HOSPITAL WARD.
Butler & Rodman, Architects.

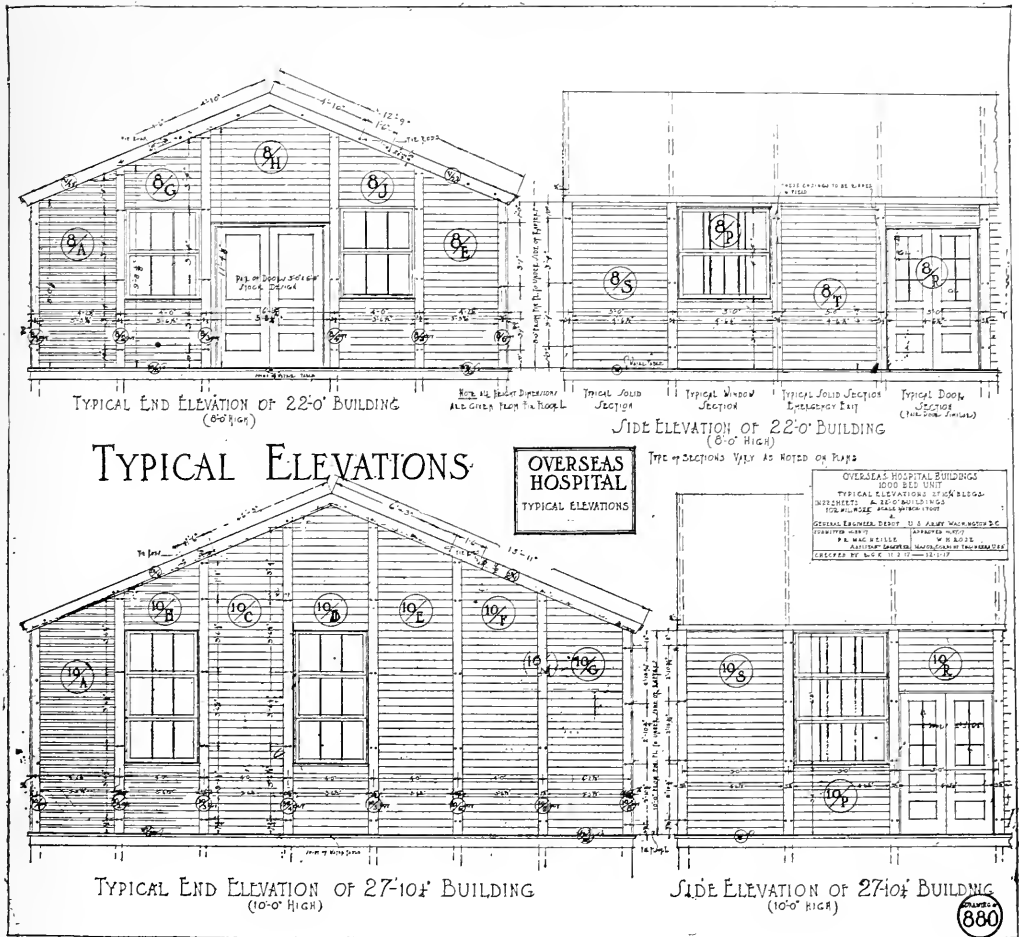
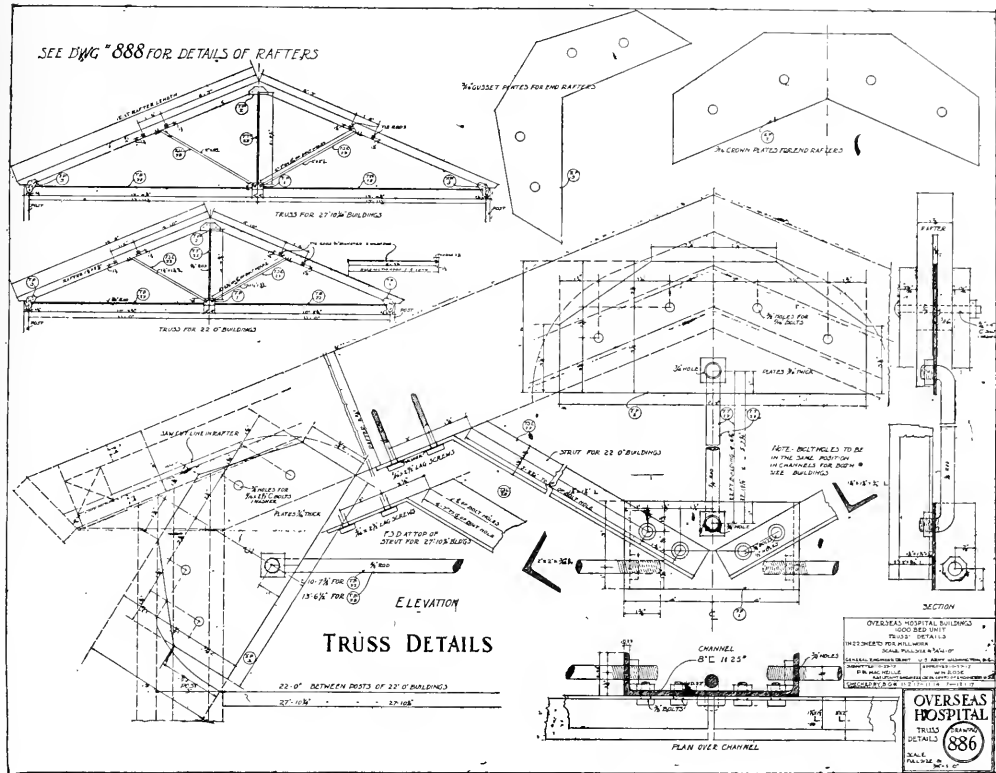


FIG. 449.



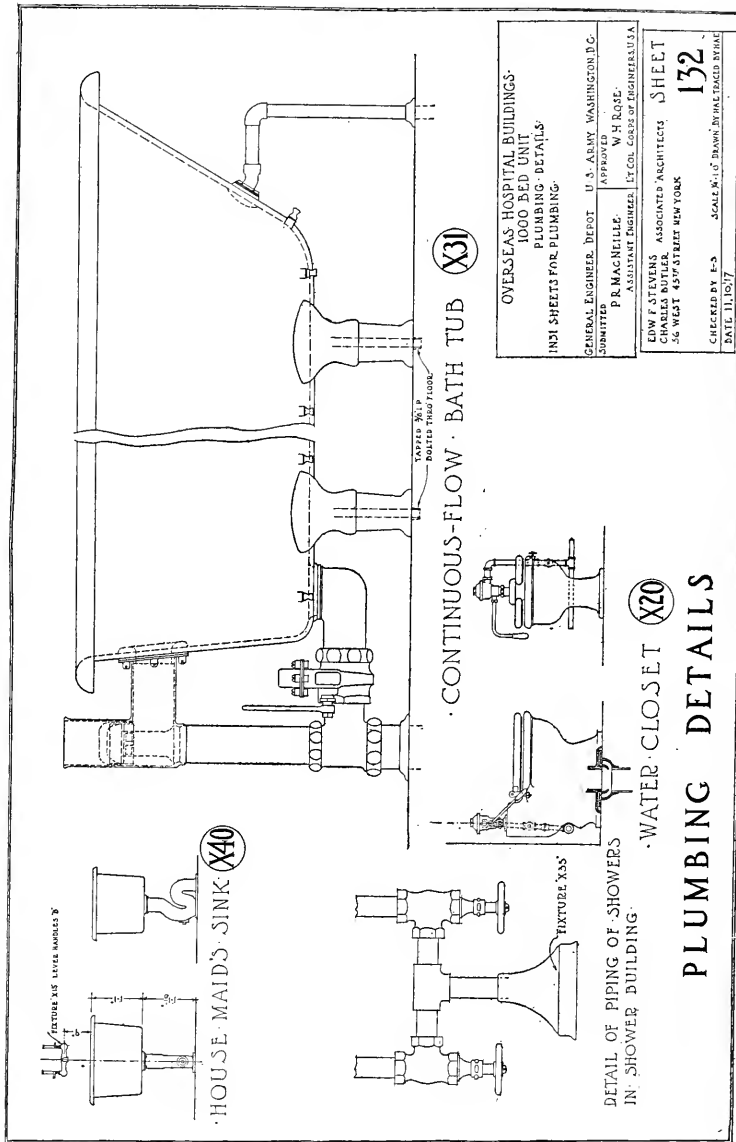


FIG. 453.

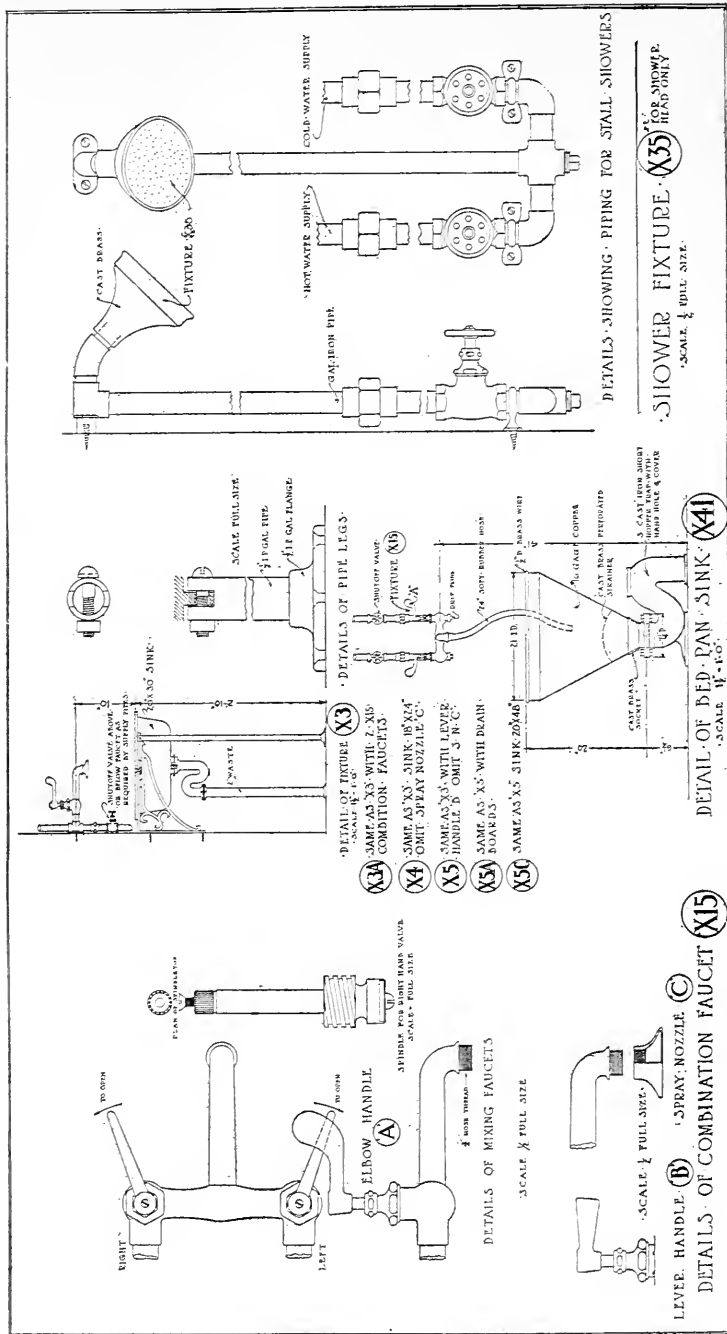


FIG. 451.



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